FOURTEENTH ANNUAL REPORT

OF THE

REGENTS OF THE UNIVERSITY

OF THE

STATE OF NEW YORK.

State Museum
Albany

ON THE CONDITION OF THE

STATE CABINET OF NATURAL HISTORY,

AND THE

Historical and Antiquarian Collection annexed thereto.

Made to the Assembly, April 10, 1861.

ALBANY:
PRINTED BY C. VAN BENTHUYSEN.
1861.

STATE OF NEW YORK.

No. 136.

IN ASSEMBLY,

April 10, 1861.

FOURTEENTH ANNUAL REPORT

Of the Regents of the University, on the condition of the State Cabinet of Natural History, and the Historical and Antiquarian Collection annexed thereto.

To Hon. D. W. C. Littlejohn, *Speaker of the Assembly :*

Sir—I have the honor to transmit the Fourteenth Annual Report of the Regents of the University, on the State Cabinet of Natural History, and the Historical and Antiquarian collection annexed thereto.

I remain, very respectfully,

Your obedient servant,

G. Y. LANSING,

Chancellor.

April 10, 1860.

REGENTS OF THE UNIVERSITY, 1861.

STANDING COMMITTEE OF THE REGENTS,

SPECIALLY CHARGED WITH THE CARE OF THE STATE CABINET.

1861.

REPORT.

To the Legislature of the State of New York:

The Regents of the University respectfully report that among the additions made to the Cabinet during the last year, are remains of the Mastodon, found at Ellenville, in the county of Ulster. While these wonderful animals, the giants of former days, have become entirely extinct, they have left the evidences of their former existence in various parts of the United States; but in no places in more perfect preservation than in the counties of Orange and Ulster, in this State. A skeleton nearly perfect was many years since found near Newburgh; and in digging the drains of a swamp more recently, in Ellenville, a large tusk, parts of the skull and several detached bones were obtained. During the last summer, other remains in the same locality were found; and, in the hope of obtaining an entire skeleton, the Secretary of the Board, and the Curator of the Cabinet were directed to make a thorough examination of the grounds. Every facility for doing this was granted by John McElhorn, Esq., the owner. A tusk more than seven feet long, from which some three feet had been broken, evidently during the life of the animal, parts of the upper and lower jaws, in which are several teeth, and the principal parts of the skull, from all of which it is confidently expected that an entire skeleton of the head can be constructed, were obtained. A heavy rain, which occurred soon after these excavations, arrested the work.

The swamp in which the bones were found is composed of about two feet of peat and three of marl, resting on a base of clay. The bones are in the marl, and those found were near the outlet of the swamp, which is several acres in extent. Should the ensuing season be favorable, further examinations may be made.

A valuable collection of shells, principally from the Pacific, has been received from the Smithsonian Institution. They are not catalogued, because few of them are yet described or named.

It is proposed to keep them as a distinct collection, to be labeled "From the Smithsonian Institution."

The specimens representing the Palæontology of the Geological department have been labeled, as named and described in the first and second volumes of Prof. Hall's work on that subject. The completion of the third volume will furnish the means of extending the labeling through its descriptions.

It is proposed to occupy the entire second floor of the Geological building with collections from this State; admitting only those from other States, which, by comparison, will illustrate our own formations.

It is the purpose of the Regents to renew their efforts for forming a department of Economic Geology, and to gather representatives of all the natural productions of the State which are applied to the purposes of life.

A popular view of the Geology of the State, with special reference to its exhibition in the Cabinet, has been prepared by Ledyard Lincklaen, Esq., and is herewith submitted as an appendix to the report. It will be of great use to persons visiting the Cabinet, and who are not fully instructed in the subject, and as a guide to the arrangement and study of the collections.

Prof. Hall's contributions are continued, and are regarded as very valuable; anticipating as they do the descriptions of the fourth and fifth volumes of the Palæontology, and thus presenting at an early day to the scientific world what would otherwise be long delayed.

By order of the Regents.

G. Y. LANSING, *Chancellor.*

S. B. Woolworth, *Secretary.*

ACCOUNT CURRENT.

The Secretary of the Regents of the University, in account current with the appropriation for preserving and increasing the State Cabinet of Natural History.

Dr.

To balance to new account, (see Senate document No. 89, 1860, page 8,)	$512 47
To amount received from the Comptroller, being the annual appropriation for 1859–60,	800 00
	$1,312 47

Cr.

By cash paid James A. Hurst, Taxidermist, for a large deer and other animals, catalogued in the last report,	$300 00
By cash paid Philip P. Carpenter, for expenses of arranging the Mazatlan shells,	288 00
By cash paid J. C. Boynton, for assisting the Curator,	110 00
By cash paid J. Davis, for painting and glazing,	26 65
By cash paid A. McClure & Co., for alcohol, camphor and bottles,	32 25
By cash paid W. C. Little, for subscription to Silliman's Journal, for 1858 and 1859,	10 00
By cash paid for Gazetteer and Map of New York,	10 00
By cash paid for Express charges and cartage,	41 47
By cash paid to carpenter,	16 64
By cash paid for stationery,	7 75
By cash paid for bones of the Mastodon,	74 88
By cash paid to C. Mull and H. A. Danker, for birds,	2 00
By cash paid to S. F. Baird, for paper trays for shells,	4 81
	$924 45
By balance to new account,	388 02
	$1,312 47

In behalf of the standing committee on the State Cabinet, I have examined the above account and find it correct. The payments have been made by order of the standing committee, and are accompanied with proper vouchers.

(Signed,) E. D. MORGAN, *Chairman.*

April 9, 1861.

CONTENTS OF THE APPENDIX.

APPENDIX.

(A.)

Catalogue of additions made to the State Cabinet of Natural History, from January 1, 1860, to January 1, 1861.

Dr. A. SMITH, Little Falls.

Coal Plant, Beaver County, Pa.

THEODORE KERNER, East Greenbush.

Skins of Serpents from the East Indies, collected by Major William Taylor, British Army: 2 Cobre di capello; 1 Cobre di manilla; 1 Whip Snake; 2 Carpet Snakes; 1 Boa (species?); 7, Species (not stated).

JOHN BIRMINGHAM, San Francisco, Cal.

Sulphuret of Silver, Washoe mines.

Hon. AUGUSTUS BEARDSLEE, East Creek, Herkimer county.

Banded Proteus.

Prof. R. W. HASKINS, Buffalo.

Petroleum, native and clarified, Pennsylvania.

HORACE AVERILL, Albany.

Brown Hematite, several specimens.

Logea Punctata. (Squid.)

Lumpus anglorum. (Lump-fish.)

Hon. GEORGE W. PRATT, Esopus.

Bottle of Water from the Dead Sea.

JAMES McARTHUR, Clyde, Wayne county.

Skull of a Wolf.

Skull of a Mink.

Dr. E. EMMONS, Albany.

Cast of the head of a Rutodon, North Carolina.

Cast of the tooth of extinct Whale, North Carolina (both fossil).

A. H. WORTHEN, State Geologist, Springfield, Illinois.

Poteriocrinus missouriensis.
Melonites poriformis. Carboniferous limestone, St. Louis, Mo.

C. P. STAATS, Albany.

Banded Proteus.

LEDYARD LINCKLAEN, Cazenovia (deposited).

Goniatites expansus. Marcellus shales.
Goniatites, species? Marcellus shales.
Phragmoceras, species? Marcellus shales.
Pleurotomaria, species? (two specimens).
Proetus crassimarginata (two). Corniferous limestone, Stafford.
Homalonotus dekayii, Hamilton group, Cazenovia.
Nucula (two specimens), Hamilton group, Cazenovia.
Fragment of a large trilobite, Corniferous limestone.
Ammonites bucklandi, Lias, Germany.
Ammonites colubrenni, Oolite, Bavaria.
Cyprina hessii, Wealden clay, Hanover.
Paludina fluviorum, Wealden clay, Hanover.
Polimædes carbonaria, Wealden clay, Hanover.
Orbitulites concava, Upper Greensand, France.
Aptychus lævis, Oolite, Lithographic slate, Germany.
Natica inflata, Devonian, Hartz mountain.
Cardium acardo, Myacine, Crimea.
Calymine blumenbachii, Upper Silurian, Dudley, England.
Ammonite, species? Oxford clay, France.
Melania, species? Oxford clay, France.

H. A. HOMES, Albany.

Silver Ore, Stevenson's mine, Arizona.

E. W. COOK, Lockport, Niagara county.

Skull of Beaver.

ISAAC COLES and others, Glen Cove, L. I.

Undescribed Fish.
Libina caniculata.
Polyphemus occidentalis.
Panopsi herberti (10 specimens).
Squilla empura.
Gelasimus vocans (10 specimens).
Pargurus pallicaris.
Lupa dicantha (2).
Platycarcinus irroratus (10).

G. L. RIDER, Norwich, Chenango county.

SLAB with Crinoidal column, Hamilton group.

BONES of a MASTODON, Ellenville, Ulster county. These consist of the principal parts of the skull; the jaws, in which are several teeth; a pelvic and thigh bone; vertebræ, and a tusk.

(B.)

GUIDE

TO THE

GEOLOGY OF NEW YORK,

AND TO THE

STATE GEOLOGICAL CABINET.

PREPARED BY DIRECTION OF THE REGENTS,

By LEDYARD LINCKLAEN, Esq.

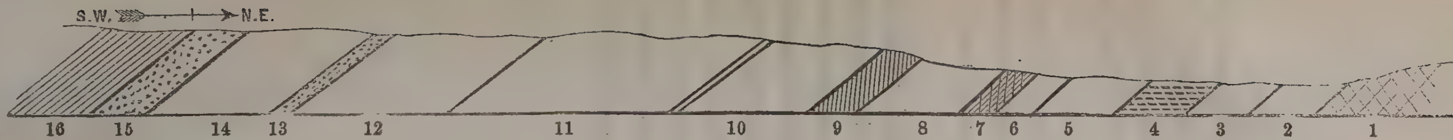
THIS pamphlet is prepared chiefly for the guidance of those visitors to the State Museum who have given little attention to the subject of which it treats; in hopes that it may render the collections more generally instructive, and aid to awaken a more general interest in geological observation.

It has therefore not been strictly confined to a description of the rocks of New-York; but a short sketch of the elementary principles of geology, and some account of formations later than those known in this State, have been introduced.

Those visitors (comparatively very few in number) whose special studies have made all this familiar to them, will not think that too much pains have been used to simplify and explain the subject, when they remember how little clear understanding of it prevails even among persons of liberal education. It is to aid in making the State Collection an educational institution that this little epitome has been compiled, mainly from the State Reports on Geology and Palæontology; and persons already acquainted with the science, or who wish to become critically so, will find in those large volumes the most accurate and abundant information.

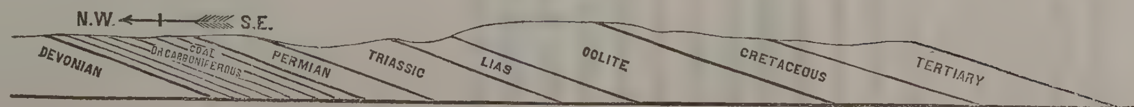
L. L.

February, 1861.



1. Hypogene.
2. Metamorphic.
3. Potsdam and Calciferous sandstones.
4. Chazy, Birdseye, Black-river, and Trenton limestones.
5. Utica slate and Hudson-river group.
6. Medina sandstone.
7. Clinton and Niagara groups.
8. Onondaga-salt group.
9. Helderberg rocks.
10. Hamilton group, ending with Tully limestone.
11. Portage and Chemung groups.
12. Catskill group.
13. Conglomerate.
14. Carboniferous red shale.
15. Great conglomerate.
16. Coal measures.

Section showing the succession of the strata from N.E. to S.W. across Central New-York.



Section showing the succession of the strata from N.W. to S.E., from Derbyshire to Sussex.

NOTE.

The "sections" on the opposite page are intended to show the succession of the rocks of New-York, and also of higher rocks as seen in England. The first or upper section presents the successive rocks in the same manner and order in which their edge would be seen, if a deep excavation reaching down to the sea-level were made from near Gouverneur or Edwards in St. Lawrence county, to Blossburg in Pennsylvania, and we could look at its western wall. The strata are found through most of the State to slope downward, or "dip" toward the south about thirty feet in a mile; so that as we pass on the surface from north to south, we come continually to higher and higher layers. It is owing to this fact, much more than to the greater elevation above the sea level of the more southern counties, that they are found to contain higher and newer strata than those of Middle or Northern New-York.

The relative proportions of this section are greatly distorted: for it is necessary to draw it with a height of at least half an inch on the paper, in order to allow its separate divisions to be seen at all; and if its length had been drawn on the same scale of about a mile to the inch, the entire section would have been twenty feet long. It has therefore been shortened so that the scale of distances is but about one-fortieth of the scale of heights, and this has necessarily exaggerated the "dip" or slope of the strata in an equal proportion.

The second or lower section gives a general view in the same way of the succession of the higher formations of strata across England, from Derbyshire to Sussex. It is drawn in the simplest manner, without attention to proportion; omitting all details, and showing only the main features of the great series.

All the stratified rocks of New-York, like those of other countries, are the product of the sea. All these vast beds of sandstone, slate, and limestone, were once deposited from the waters of an ocean, which bore their materials either in chemical solution, or mechanically suspended in the form of fine sediment. The petrified shells, fishes, plants and similar objects which are so commonly found in the rocky layers, are the remains of organic things which either lived in the waters from which the rocks were deposited, or which were washed into them from adjoining shores. Therefore, we have in these remains specimens of the animated population or of the vegetation of earth and sea, which lived when these rocks were deposited. This is the great lesson of all historic geology; and to make it more clear, let us look at the processes which are daily going on under our own observation.

The rain which falls on our hills or plains, slowly, but surely wears away their substance. The waters run from every slope, or rise from every spring, loaded with particles of the earth; either dissolved in a limpid stream, or suspended in a turbid torrent. The process is slow indeed; so slow, that our brief observation can detect its steps only in a few instances; but it is not the less real and certain. The work of wear or abrasion has never stopped since the first shower fell on the dry land, and the first river began to run; and it must ever continue while the elements remain as now. Every exposed inch of the earth's surface is wearing away more or less rapidly, and sending its minute tribute of solid matter through the rivers to the sea. As this waste of the dry land is swept out from the river-mouths into the ocean, it becomes mingled with other sediments worn from exposed coasts by the tides and the waves, or by sea-currents, and all are borne together to the stiller waters beyond these influences. There they gradually settle down to the bottom, the coarser and heavier sediments falling nearest the land, the finer and lighter particles being carried farther to sea.

In these ocean-depths there is thus always in progress a process the reverse of what takes place on land: in the one, there is perpetual wearing away; in the other, perpetual accumulation. In the sea bottom are constantly forming layers upon layers of sand, fine slime, or calcareous mud. In a few places, such as near the mouths of great rivers, these accumulations go on rapidly, but on the average their increase must be exceedingly slow; for the sea deposits can be formed no faster than the waste of the dry land furnishes material, and the average filling up of the ocean's bed must be as slow as the average wearing down of the continents. Slow as it is, however, it is uninterrupted. Year after year, century after century, cycle after cycle it continues, and new layers are added to the increasing pile in every age. The deposits formed during this century overlie and conceal those of the last; beneath the latter, lie those of preceding ages; and at the base of all must be buried those of the first periods of creation.

But it is not only the inanimate dust of earth which is thus carried into the great storehouse of the sea: there lie millions of shells of a thousand kinds; there the remains of innumerable fishes and other forms of life which inhabit the waters, fall, to settle into the oozy bottom; thither float leaves and reeds and tree trunks, drifted from many shores; there sink the skeletons of sea fowl and exhausted land birds, and the remains of drowned quadrupeds swept out to sea by rivers. All these relics are there slowly buried by the ever-settling sediment; every layer containing the remains of such things as lived at the time it was formed beneath the waters. Thus the bottom of the sea becomes a Great Cemetery, in which are buried, by natural agencies, more or less of the relics of every age of earth's history; the deepest and oldest layer of all containing the remains of the living things of its primeval period, those higher in place containing relics of proportionately later centuries, and the highest of all containing the animal or vegetable forms which exist on earth at the present day.

If we could gain access to this sea-bottom, and examine its successive layers, gaining knowledge of the remains of greater and greater antiquity as we penetrated deeper and deeper from its surface, it is easily seen what perfect evidence we should have of the past progress of the world, and how interesting would be the revelations as to whether the living things of early ages were

like those of the present, or whether a variety of plans and different forms of animated existence had maintained a long series of changes, of which the present inhabitants of earth are only the latest arrangement.

Now this is precisely what we have in the stratified rocks, and this study of the order of organic creation, as displayed in their buried contents, is the chief object of Geology; the reading of the history of earth from its own natural records, formed in the way we have noticed.

That these stratified rocks are really old sea-deposits, is perfectly proved by their form corresponding to that produced by deposition from water, by their buried relics of shells and fishes and other remains, by the ripple-marks so plainly visible on the surfaces of many layers, and other evidences. Their present hardness is chiefly the effect of chemical action among their particles, or of consolidation by their own weight and the pressure of higher layers. Their present elevated position is due either to their having been uplifted by subterranean forces above their parent sea, or to the recession of its waters to deeper basins formed by the subsidence of other parts of the earth's surface, both causes having doubtless combined to produce the result.

The broken and abrupt form in which we often find these strata now to exist, projecting their edges from the banks of ravines or slopes of high hills, is explained by the consideration that during their slow emergence from the sea, they were subjected to the wearing action of waves and marine currents which must have removed considerable portions of them; and that ever since then the action of rains and streams during enormous periods have carried on the wearing (or, as geologists call it, the "denuding") process to the point at which it now stands; the whole series of strata, many thousand feet in thickness, being deeply worn and furrowed into hills and valleys. These processes are difficult to trace, for their effect has been always to obscure in one period what was done in a previous one; but the evidences of enormous wear are visible to every observer who studies the face of the country.

These stratified rocks (as might be presumed from this view of their origin) lie, not as many unobservant persons think, in shapeless masses, left confusedly here and there, but in vast sheets or widely extended layers. Many of these, though only a few feet in thickness, extend from one extremity of the State to the other,

and spread far beyond into adjoining regions. Some of them are plainly traceable far southward along the Alleghanies through Virginia, southwestward to Tennessee, northeastward to the Lower St. Lawrence, or northwestward beyond the Upper Mississippi. Thus far, at least, spread the ancient sea on the floor of which these successive sheets of sediment were deposited; and over all this vast extent the same groups of fossil forms prevail, proving that the living population of that old ocean was much the same over its whole extent at each successive period.

We say its living population was *much* the same in all parts at the same period: it was so, but not *entirely* the same. In existing oceans the living population varies more or less in different parts: for instance, out of an hundred shells gathered on the shores of Massachusetts, and an hundred gathered on the coast of Great Britain, only about thirty-five per cent will be found identical; while of the remainder, a large proportion are very similar on both sides of the ocean, so that they may be called "geographical representatives" of each other: a small number, beside, will be found quite peculiar to one coast or the other. We may therefore reasonably expect to find a similar degree of correspondence among the organic relics from different parts of any of the rocks so widely spread; and this is exactly the fact, as proved by observation. A particular bed of limestone, for example, will be found in Ohio to contain not entirely the same fossils found in it in New-York, but a great proportion of them; while in each of these distant localities, some will be discovered which are not known in the other. This is even true where the character of the rock itself changes in different districts. A certain series of strata may in New-York be slates or sandstones: when examined further west, it is found that they become more and more calcareous, until in Kentucky they may be almost pure limestones, varying from their New-York aspect not only in texture, but perhaps in color also. Yet the imbedded fossils will be found so much the same, that a practised observer will at once recognise the rock by them; and having thus found one portion of the series of strata to be identical with a particular set of layers known here, he is able to guide himself with great certainty in the search for other parts of the series which it may be desirable to discover. This principle is often applied with great advantage in searching for such minerals as may be known to

occur in a certain position in the series, such as coal, or some beds of iron ore.

Yet the chief interest of fossils is in their historic value, as giving us records of the condition of earth and sea and their inhabitants at the different periods of the vast succession of ages during which all the stratified rocks known were deposited; of which, much will appear in the detailed account hereafter given of the separate rocky strata.

These relics are found in a great variety of conditions. Shells are found with both valves united as when living, either open or closed; but more frequently with the hinge broken and the valves separated. Sometimes they are hardly changed from their original texture; at other times, quite "petrified," or replaced by stone like the surrounding rock: in some cases they are converted into iron pyrites; in others, into white calcareous spar, with crystals of which their cavities are often lined or filled. Often the shell has decomposed, leaving in the rock only a hollow marked with its external impression: sometimes we find a cast or mould of its interior, showing the forms of the teeth of the hinge, and the pits or other marks where the inhabiting animal was attached to it. Often they are distorted or compressed even to flatness, by the consolidating or settling of the material in which they were imbedded. (This is especially common in slaty rocks; while in limestones, which would seem to have hardened at once when first deposited, shells are usually not compressed.)

Other fossils occur in various conditions. Fishes are rarely perfect, the skeleton being generally separated and the bones and scales more or less scattered. Crustaceans, or animals with jointed coverings like the lobsters or crabs, are also usually found to have been disjointed by decay before they were buried in the sediment, so that specimens in an entire state are not common, though detached plates are abundant. The stems of plants are usually much flattened, and often converted into coally matter; while leaves generally show as mere imprints in the stone, blackened by the carbonaceous remains of their substance.

From this brief notice of the origin of the stratified fossil-bearing rocks and the nature of their organic relics, we may be prepared to appreciate the value to the cause of science (which is only another name for accurate knowledge) of a thorough investigation of a series of these rocks and of their fossil con-

tents. Such a series of all the rocks older in date than the great Coal formation exists in New-York, much better exhibited than in any other region yet known.

The same series exists in great thickness along the range of the Alleghanies; but they are in that region so much upheaved, displaced and contorted that it is very difficult to trace their edges so as to learn their true position and succession. In that range, also, fossils are few; either from their original scarcity in that part of the ancient sea, or because subsequent changes in the rock have obliterated their remains, so that the all-important aid which they afford in studying the strata can be but sparingly obtained.

In New-England it is still worse; for there the rocks are not only broken up and distorted in position, but so changed or metamorphosed by the action of heat and other causes, that all fossils are obliterated except in a few rare instances, and the rocks are recognizable in their true character with great difficulty.

In the Western States the case is different : there these strata are almost as level as when originally formed, and they contain many well preserved fossils. But in that direction many of them "thin out," or diminish in thickness; so that while some important groups of strata quite disappear before reaching Ohio, others, which in New York are many hundred feet thick, are in the West but a few yards;* and the level and unbroken character of most of that region, covered with gravels or alluvial soil, prevents the rocks from being well examined in many districts.

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*The thinning out of the rocks westward is very remarkable. Tracing them from New-York and Pennsylvania to Iowa, we find the Hudson river group and Oneida conglomerate diminish from 2000 to 100 feet; the Medina sandstone runs out entirely; the Onondaga-salt group diminishes from 1000 to 150 feet; the Hamilton, Portage and Chemung groups, from 4000 to 200 feet; the Catskill group, from 3000 feet in New-York, disappears entirely in the West; and the Carboniferous, 6000 feet thick in Pennsylvania, is only 600 in Iowa. And it is also true that all, or nearly all, the coarser sandy rocks, traced westward from New-York, are found to become finer-grained and more calcareous, as well as thinner; while the limestones generally keep their thickness from east to west, with little or no diminution.

These facts lead to the belief that the source whence the materials of these rocks were derived was at the East; and that while the old marine currents spread the sediments very freely and heavily in this region, only a small portion of them, and that of the finest and lightest kind, was carried into the western part of the old ocean to form the thin and fine-grained strata of Iowa, Wisconsin and Minnesota.

The same strata above mentioned as so thick in New-York, are far thicker still in the range of the Alleghanies, and also in the continuation of their range through the Green mountains and the White mountains (where they have been much changed, as will be hereafter shown);

But in New-York, almost all facilities for their study exist. Its territory lies between the broken and metamorphosed Eastern part of the formations, and the thinner though level strata of the West: it contains these rocks in thick masses, full of fossils, and well exposed in numerous ledges and quarries; while it has this remarkable feature, that the outcropping edges of the strata chiefly run across the State in successive belts extending from East to West, while the streams which drain the country generally run North and South, thus cutting across the edges of the strata, and exposing in their bordering precipices and ravines excellent natural sections, where almost every layer can be examined. Such instances are well known on the Niagara, the Genesee, and the West-Canada; and hundreds of less conspicuous examples can be seen between the Hudson and Lake Erie. The eminent English geologist, Mr. Lyell, in his first book on America, remarks, after speaking of his journey through this part of New-York:

"In the course of this short tour I became convinced that we must turn to the *New World* if we wish to see in perfection the oldest monuments of the earth's history, so far at least as relates to its earliest inhabitants. Certainly in no other country are these ancient strata developed on a larger scale, or more plentifully charged with fossils; and as they are nearly horizontal, the order of their relative succession is always clear and unequivocal." This is no more than the truth; for though rocks of similar age are found on a large scale in England and other parts of Europe, there is nowhere else to be seen so complete, undisturbed and accessible a series as here.

It was therefore most fortunate that the munificence of New-York provided for an early and complete survey of her territory; the facts discovered in the course of which gave at once a stand-

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and indeed it seems proved by Mr. Hall that the height of these mountain ranges is mainly due, not so much to the uplifting or folding of the strata by subterranean forces of elevation, as to the enormous depth or thickness in which the materials of these rocks were originally deposited in this region.

The causes of such great inequalities in the thickness of the ancient sea deposits may be easily imagined, though we cannot prove them. We may believe that a great sea-current, like the modern Gulf stream, may have swept over or near this long N.E. and S.W. range, carrying with it and depositing in the vicinity of its course vast quantities of heavy sediment, while to other parts of the sea but little found its way; or that the ancient or primeval land from which the sediments may have been derived, lay to the eastward. These, however, are mere speculations: all we can be assured of at present, are the facts as above stated.

ard by which to study and compare the strata of all the Northern, Eastern, and Western States, and by which to unravel all the main features of American palæozoic* geology. The New-York Reports have been text-books for observers elsewhere, and the same local names given in them to the various strata are known and used over almost half the continent.

This Geological Cabinet is intended, when completed, to exhibit specimens of all these rocks, and especially of their organic relics; which will be made accessible also to the scientific world at large, by being fully figured and described in Professor HALL's work on the Palæontology† of New-York, now in its third volume.

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* PALÆOZOIC, from the Greek *palaios*, ancient, and *zoe*, life; a term applied to all the strata containing remains of living forms from the top of the Carboniferous system down.

† PALÆONTOLOGY, from the Greek *palaios*, ancient, *ontos*, existence, and *logos*, discourse or science, signifying the science or knowledge of ancient existences; a term applied to the study of all fossil remains.

The stratified fossil-bearing rocks, of which alone we have hitherto spoken, cover all the State of New-York, except the southeastern corner from Newburgh and Fishkill to the sea, and the Adirondack region comprising most of the country lying between Lake Champlain and the Black river. These two portions of the State exhibit rocks of a different character.

Next below the lowest of the fossil-bearing rocks are generally found a series of hard, semi-crystalline strata, of which gneiss is the most common and conspicuous form; though they embrace many other varieties, such as the coarse gritty rock known as mica-slate, and the coarse-grained crystalline white marble of Westchester county. These rocks are believed to have been originally in most, if not all cases, sandstones, limestones and slates, much like the fossil-bearing strata before described (though generally older in age and lower in position), and to have been exposed to the influence of subterranean heat and great pressure in such intensity that their whole appearance has been changed, and their materials so affected as to suffer chemical changes which have produced the coarse crystalline structure which most of them present. The same cause must have obliterated their fossils, if they ever contained any. Instances are known in many places where the outbreak of a vein of lava, trap, or some other melted mass from below, has cut through stratified rocks, and the heat has changed them at the place of contact so that black limestone becomes white crystalline marble, sandstone becomes a close grained jaspery rock, and the fossils of both are obliterated; though at a short distance both these rocks retain their usual appearance, and their fossils are distinct. Such facts seem to prove fully that the class of rocks of which we speak have been changed by heat from their original character, and they are therefore known as METAMORPHIC rocks, a term derived from Greek words signifying "changed in form."

These rocks seem almost everywhere to underlie the older fossil-bearing strata, and appear where uplifts from below have

broken through the latter. Such an instance occurs at Little-Falls, where the hard red and gray gneiss has been lifted up in a ridge across the Mohawk, and appears in the gorge protruding through the fossil-bearing slates and limestones. Most of New-England is covered by rocks of this character; their broken, bent, and upheaved position bearing witness to their having been subjected to enormous pressure in every direction. Even there, in some localities there are portions of these rocks which show traces of fossils, to prove that they are only altered or changed masses of the same strata which in Western New-York appear in horizontal and unchanged layers of limestone; and it is believed that the coarse crystalline rocks of the White and Green mountains are in fact extensions of the same masses, which have undergone a similar transformation.

Still below these metamorphic rocks are found what are known as HYPOGENE or PLUTONIC * rocks. These include granite,† trap, greenstone, porphyry, and many other varieties of hard crystalline rocks, the great peculiarity of which is that they are not found in layers or strata, but in shapeless masses, and appear, instead of having been formed by deposition from water, to have been upheaved from below. They bear evidences of having been intensely heated, and in many instances have calcined or *baked* other rocks with which they come in contact as before mentioned. Though in their original position the lowest of all rocks, they have in many places been upheaved far above others; and in most high mountain ranges, the cone or central ridge is formed of these rocks, which have been thrust upward, splitting through and tilting up all which lay above them. They form the central mass of the Adirondacks, and masses of them are found in the Highlands and in many parts of New-England, the well known Quincy sienite being one form of hypogene rock. They were once generally called "primary" or "primitive," as it was

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* HYPOGENE, signifying born from below. PLUTONIC, from *Pluto*, king of the infernal regions in Pagan mythology.

† GRANITE is a hard crystalline rock, made up of crystals of quartz, felspar and mica. There are many varieties of rocks of similar nature, varying by having some other minerals replacing or added to these, such as hornblende, garnet, steatite, etc. etc. The rock varies much in color, being often red, but not uncommonly grey or dark. The frequent use of the term "granite" in popular speech to signify any hard and massive rock, is entirely incorrect. SIENITE, which is quarried at Quincy (Mass.) in great quantities, and has been so extensively used in building in Boston and for the Exchange in New-York, is granite with the mica replaced by hornblende.

believed that they were the original crust of the earth, first formed by the cooling of its melted mass, ‡ but these names are now replaced by those we have given; for it is doubted whether, if such a crust exists, we can identify it, and many able geologists think that most of the granite and other hypogene masses are only re-melted and altered forms of stratified rocks. That many such masses are so, is certain; whether we can find any which are portions of an original crust of the globe, is at least very doubtful.

Containing no fossils, these rocks have their chief interest from their value for economic uses in building and other purposes, and in the remarkable minerals which they so often contain. Most of the beautiful crystals which form the collections of the mineralogist are from these rocks, or from the metamorphic masses which overlie them; and the latter, where they are seamed with veins or dykes of melted hypogene rock, are often depositories of the metallic ores.

To recapitulate the order of these three great classes of rocks, beginning *from below*, we find:

1. The Hypogene or Plutonic masses, seen in this State in the Adirondack region and the mountainous and hilly south-eastern part of the State.
2. The Metamorphic, generally lying next above and adjoining to the former.

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‡ The "nebular hypothesis" in astronomy leads us to think it probable that the earth first existed as a hot gaseous or "nebular" body; that it afterwards slowly condensed by loss of heat into a liquid or melted globe, and that still further cooling during the lapse of ages brought it to a state in which it was covered with a thick rocky crust, and so far cooled that water condensed upon it, when the great series of changes began which have been before explained, growing out of the action of rain and rivers and sea, and leading to the formation of the stratified rocks. Many phenomena seem to confirm this opinion: such are the many volcanoes yet in activity; the innumerable instances where trap, lava, porphyry, granite, and other similar rocks appear to have risen in a melted state from below through fissures or crevices of the higher rocks; the generally changed or "metamorphic" condition of many of the deepest and oldest stratified rocks; and the universal increase of heat found in deep mines or borings, being on the average a degree for every fifty or sixty feet in depth; a rate of increase which, continued to thirty or forty miles below the surface, would melt granite or basalt. The form of the earth, also, slightly flattened at the poles and bulging at the equator, is precisely that which a fluid globe rotating on its axis would assume. It thus seems probable that the globe of our earth is, at a moderate depth, in a state of fusion or intense heat, covered only by a crust thick enough to prevent further radiation of heat to any sensible degree. Yet there are some reasons for doubting this theory; and it can yet be regarded only as an unproved, though very probable hypothesis. It is so often mentioned or alluded to, and seems to afford so good an explanation of some phenomena in geology, that this brief mention of it is deemed proper.

3. The STRATIFIED fossil-bearing rocks, covering all the State except the two districts above mentioned.

We will now describe them more in detail, beginning at the lowest and proceeding upward.

Of the HYPOGENE and METAMORPHIC rocks, however, we shall add to what has been said but very little. They cover, as has been before remarked, two separate tracts of country in this State, one in its southeastern part; the other lying in the central portion of the great triangular area bounded by the Mohawk, the Champlain and the St. Lawrence valleys. On the geological map of the State, the territory which they occupy is marked by a coloring of deep pink.

The various kinds or varieties of these rocks are mingled in great confusion over most of these tracts, seeming often to change or gradually pass into each other. The metamorphic masses of gneiss, mica-slate, crystalline limestone, etc., are more fully exposed (as a general rule) around the edges of the tracts, where they pass under the higher strata of fossiliferous rocks; while the granite, hypersthene, and other hypogene masses are more fully developed near the centres of these areas, and among the highest of their mountains.

In the southeastern part of New-York these rocks occur generally in small areas, seeming to be interposed among the gneiss and other metamorphic masses, as if they had broken up here and there through fissures or clefts. A very remarkable instance of this is on the lower Hudson. The rock at the level of the river is a horizontally stratified red sandstone; but through some fissures or rents now concealed, vast volumes of melted rock have formerly been forced up, which have overflowed the sandstones to a great depth, and in cooling have assumed the rudely crystalline or columnar structure so common in basaltic or trap rocks. The broken or worn edges of this enormous pile of trap, fronting on the river, forms the precipice so well known as "the Palisades." Veins of granite are seen in many places on the island of New-York, penetrating in every direction the gneiss rock which forms the mass of its territory.

In the hypogene and metamorphic region of Northern New-York, the higher mountains seem to be chiefly composed of gray "hypersthene" rock, made up chiefly of felspar. Granite, trap, serpentine, and many other varieties of similar rocks of igneous origin, are found in all parts of the district, and so intermingled

that no separation of their areas is practicable. The great route of travel by Lakes George and Champlain is bordered by cliffs and precipices, in which these rocks are seen in great variety. In this northern region, as well as in the southeastern part of the State, gneiss is exceedingly abundant; and in some places it appears to change into, or rather to be formed from, sandstone strata, thus exemplifying the belief of most geologists that this is only a changed or metamorphosed condition of other rocks.

All through these hypogene and metamorphic districts there are many *dykes*, or perpendicular veins of trap or other igneous rock standing among masses of a different appearance. Not uncommonly a mountain or hill range will show such dykes cutting across or through it, miles in distance, and to an unknown depth. These seem to have been merely cracks or clefts by which the country has been riven in many directions, which have been filled by the rise of melted matter from below, just as a crack in a sheet of ice is filled by the underlying waters. They are of all sizes, from half an inch to an hundred feet or more in thickness.

Except the two great districts above described, the metamorphic rocks appear only in two or three localities in the Mohawk valley, where they have been uplifted through higher and newer strata. The most conspicuous of these instances has been already mentioned as occurring at Little-falls : it is a ridge which, commencing some miles south of the river and crossing it at that point, extends on to the northeastward until it reaches and terminates on Lake Champlain near Port Kent, the loftiest of the Adirondack mountains being formed by its highest summits.

The hypogene and metamorphic rocks generally decompose slowly, and give origin to a poor or barren soil; and the districts which the coloring on the geological map indicates as formed of these rocks are the least fertile of all our State.

From the hypogene and metamorphic rocks, we pass to the consideration of the stratified fossilbearing rocks. These, in New-York, are among the most ancient of their class, called by the earlier geologists "transition" strata, from the idea that they marked a period of gradual change or progress from what they called the "primary" rocks to what were known as "secondary," the latter term including all strata newer than the Coal. By more modern observers they have been named "palæozoic," a term signifying "ancient life," from the fact that they comprise the

earliest and oldest fossil remains of once-living things. These palæozoic rocks have been again subdivided into four systems, the lowest being called the SILURIAN, the next the DEVONIAN; the CARBONIFEROUS or Coal formation succeeding, and the PERMIAN being the uppermost.

The fossiliferous rocks of New-York (with very limited exceptions which will be noticed) belong to the lower subdivisions of the Palæozoic strata, the Silurian and Devonian systems. The oldest and lowest of them,* which is found in many places to rest directly upon the gneiss, is a hard sandstone or quartz rock, usually brownish in color, though sometimes of other shades, and attaining in some places the thickness of 300 feet. Its edge can be traced nearly all around the great hypogene and metamorphic region of the Adirondacks, and is especially well seen near Keeseville in Clinton county, where the deep ravine of the Ausable river is cut through it; also at POTSDAM, St. Lawrence county, from which place it is called the

POTSDAM SANDSTONE.

It is an excellent building material. Its fossils are very few, the only distinct forms are a couple of species of minute shells of the Genus LINGULA, which are the oldest of our fossils. Specimens of them may be seen in the case marked "Potsdam sandstone;" in looking at which, the observer may be confident that he sees some of the very earliest forms of animal life which were introduced on our earth † (Fig. 1). This rock shows, on many of its layers, waved surfaces, precisely resembling the ripple-marks seen on sandy bottoms over which waters are agitated by waves or currents. They are believed to have been formed in the same

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* Professor EMMONS maintains that there exists in Eastern New-York a series of fossiliferous strata older and lower than the Potsdam sandstone; which he calls the TACONIC system, but this is a controverted point. See some remarks on it hereafter in describing the "Hudson-river group."

† We quote from HUGH MILLER his popular description of this shell. "The LINGULA still exists in some two or three species in the distant Moluccas. There was but one of these known in the time of CUVIER; and so unlike was it deemed to any of its cotemporary mollusca, that of the single species he formed not only a distinct genus, but also an independent class. The existing, like the fossil shell, resembles the blade of a shovel; but the shovel has also a handle, and in this mainly consists its dissimilarity to any other bivalve. A cylindrical cartilaginous stem or footstalk elevates it some inches over the rocky base to which it is attached, just as the handle of a shovel stuck into the earth would elevate the blade over the surface, or as the stem of a tulip elevates the flower over the soil. I am not aware that any trace of the cartilaginous footstalk has yet been detected in fossil Lingulæ; but in all that survives of them, or could be expected to survive, the calcareous shell, they are identical in type with the living mollusc of the Moluccas."

way, by movements of those waters under which were deposited the sands which we see hardened into the Potsdam sandstone. Similar markings are frequent in almost all rocks of sandy texture.

The Potsdam sandstone, though not seen distinctly in the Mohawk valley (where its place between the gneiss and the Calciferous sandstone appears to be vacant), is a thick mass in Pennsylvania, and is known northeastward and northwestward over a great area. It is seen on the Lower St. Lawrence, and can be traced westward by the north shore of Lake Huron, and the south shore of Lake Superior, through Wisconsin, Minnesota and Northern Iowa, and has even been recognized in the "Black Hills" near the Rocky mountains. In this extension it often varies in color and hardness, being in some places so soft as to crumble with very little difficulty; but it is always mainly a siliceous rock, though with some bands which contain a portion of lime. The little *Lingula* is found in the far northwest as here (specimens being in the cases from the Falls of the St. Croix, Wisconsin), and in that region it contains a few remains of trilobites.

Next above this sandstone lies another, which, however, contains a considerable portion of lime mingled with it, and thence has received the name of the

CALCIFEROUS SANDSTONE.

It may be described as a siliceous or gritty limestone, generally of a brownish color, lying in straight thin layers, and attaining an entire thickness of two or three hundred feet. It is well seen at the "Noses" about Fonda on the Mohawk, and also at Little-falls; in each of which places it has been raised to light by an uplift which has brought it from its originally lower position. It may also be examined near Middleville on the West-Canada creek (where it contains in its cavities many beautiful quartz crystals), and in many places in the vicinity of Lake Champlain and the St. Lawrence river, in which latter region it has some layers so purely calcareous as to be profitably burnt for lime. Toward the west and northwest it extends about equally with the Potsdam sandstone, seeming in some localities so much like it as not to be easily distinguished from it, though in most places it is highly calcareous, forming the "Lower Magnesian limestone" of the Upper Mississippi as described by Dr. Owen; and it is seen in moderate thickness in Pennsylvania. (In Missouri, a limestone belonging at the junction of this rock with

the next above affords lead ore; but the great depositories of this mineral in Wisconsin belong to a higher rock.)

The Calciferous sandstone contains a considerable number of fossils, which are described and figured in the first volume of Professor HALL's Palæontology of New-York (the same volume embracing the fossils of all the strata up to and including the Hudson-river group). Among them are many obscure forms, which are thought to be the remains or impressions of fuci or marine plants (though their true nature is not always clear), and which go under the general name of *fucoids*. There are also a few shells, nearly all of coiled forms, but they are rare in most localities. It is interesting to know the earliest forms in which this class of animal life appeared : they were those known to scientific men as EUOMPHALUS, a shell coiled nearly in a horizontal plane; OPHILETA, a very similar but obscure form; and MACLUREA, the characters of which are mentioned in describing the next rock. This rock also contains a few generally imperfect shells of the peculiar family to which the name of *Orthoceras** has been given. Their character and structure will be explained in speaking of the Black-river limestone.

The variety of living things which existed in the sea from which this rock was deposited, does not appear to have been large; and so far as we yet know, it embraced no type of higher order in the scale of life than the inhabitants of the coiled or bivalve shells, or the animal inhabiting the shell of the Orthoceras, which was a mollusc † of higher organization, something like the cuttlefish of the present day.

Next above the Calciferous sandstone, we find a dark, irregular, thick-bedded limestone, called, from the locality where it is best seen (in Clinton county), the

CHAZY LIMESTONE.

Dr. EMMONS states its thickness at 130 feet on Lake Champlain; but, in striking contrast with the wide extent of many other rocks, it is known only in the Champlain valley, and does not appear to extend in any considerable thickness into those parts of the State west or south of the Adirondack region; and it is

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* ORTHOCERAS, from the Greek *orthos*, straight, and *keras*, a horn; referring to the straight and tapering form of the shell.

† MOLLUSCS are soft-bodied animals, most of which, like the oyster, inhabit shells; though many are naked, such as some snails, slugs, and the common cuttlefish or sepia.

not seen as a distinct or separable mass in the Mohawk valley, though the rocks above and below it are there well known. In the far West, in Iowa, the place of this rock in the series is occupied by what is called the St. Peters sandstone, there 60 or 80 feet in thickness; and this sandstone forms the lower part of the precipice at the Falls of St. Anthony, being there covered by the Trenton limestone, the lower part of which forms the brink of the fall and the floor of the rapids above. Southward this limestone (together with the succeeding Black-river limestone) becomes enormously developed by the thickening of its parts and the addition of other strata; so that, if we may rely on the measurements of the Pennsylvania geologists, it becomes in that state from 2500 to 5500 feet in thickness! * Like most of the rocks of that region, it is there not very prolific of fossil remains.

The Chazy limestone contains a considerable variety of fossils, among which the most conspicuous is the *Maclurea magna* (Fig. 2), a remarkable coiled shell; in which the coil, though close and having a nearly flat surface on the top, is open and forms a deep central hollow below. Some layers of this limestone, which are worked extensively as a dark gray marble for hall pavements, frequently show white spiral coils, which are merely sections of this shell, split through the middle by the saw of the stone-cutter. Such specimens are to be seen in the halls of the Delavan House in Albany.

There are also in this rock several kinds of bivalve shells belonging to the great class of "BRACHIOPODA;" the name of which, derived from the Greek *brachys*, an arm, and *pous*, a foot, refers to a very peculiar internal arrangement of these molluscs, which consists mainly in the presence within the shells of two spiral coils or arms, which bear "cilia" or minute vibratory filaments, by the motion of which the animals are believed to create currents in the water to enable them to gather their food. Mollusca of this class are rare among living shells, but were enormously abundant in the earlier periods of earth's history. They are arranged in many genera, among which are SPIRIFER, in which the shell is straight in the hinge-line, and often pro-

* Many of the groups of strata, as has been heretofore mentioned, show similar variations in thickness in different parts of their extent; the sediment from which they were formed appearing to have been deposited in great thickness at some points, while at others it was very thin or entirely wanting.

longed in two sharp lateral points; ORTHIS, which has also a straight hinge-line, but is rounded on the other sides into a form approaching a semicircle; ATRYPA or RHYNCHONELLA, in which the shell approaches a globular form; STROPHOMENA or LEPTÆNA, in which the shell is thin, nearly semicircular in outline, and bent so as to be convex on one surface and concave on the other; and various other forms. The characters here given relate merely to general external appearances; but the distinctions on which the divisions of the various genera more strictly depend, are made from peculiarities of the inner organization of the shells and their tenants. In most of the genera there is an aperture near the hinge of the shell, whence a muscular cord or "byssus" proceeded, by which the shell was attached or anchored to rocks or other substances.

In the Chazy limestone are also found several kinds of fossil corals, but they are not abundant in comparison with those of higher strata; and a few remains of crinoids and trilobites, of both which remarkable forms some account will be given in speaking of the Trenton limestone, page . There are also found in it some species of ORTHOCERAS; for a general notice of which family of shells, see the Black-river limestone.

The woodcut (Fig. 3), taken from Dr. EMMONS's Report on the Third or Northern district, shows a few of the more remarkable fossil shells from the Chazy limestone. No. 1 is the *Scalites angulatus**; No. 2, *Raphistoma staminea;* No. 3, *Raphistoma striata;* No. 4, *Bucania sulcatina;* No. 5, *Discina deformis;* No. 6, an unnamed *Atrypa.*†

The rock which succeeds the Chazy limestone is one well

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* The names given to fossils are taken from the Greek and Latin, and are always intended to be descriptive of them: thus, *Scalites angulatus* alludes to the spiral form of the shell like a winding stair, and to its sharp external corner or angle; *Bucania* refers to the trumpet-formed aperture of the shell; *Discina,* to the circular form of another; *Leptæna,* to the thin form of another still. So among the trilobites, *Isotelus* implies "equal-ended," alluding to the form of the fossil; *Trinucleus* refers to the three knobs or elevations on the buckler of the trilobite bearing the name, etc. etc. Much fault is found by many readers with these hard words; but the task of the scientific describer is not easy, when he has to find names for hundreds of new objects, and he may be excused for inventing some which are not euphonious. The frequent *alteration* of such names, growing out of the descriptions of their subjects by different writers, and out of new arrangements and systems, is, however, a serious evil, and tends to no little confusion in this as well as other branches of natural science.

† But a very small part of the many hundred fossils of the New York rocks can be mentioned in this brief article. The reader is referred to the cases in the collection, where he will find labeled specimens of most of the species; and also to Prof. HALL's Palæontology of New York, which gives careful and full descriptions and figures of every known relic from these old sea-sediments.

known in the Mohawk valley, as also along the Black river and Lake Champlain : it is a fine-grained gray brittle limestone, thirty feet in its greatest thickness; and the most conspicuous of its fossils is one the nature of which is somewhat obscure, but which is believed to have been the stems of some marine plant. Standing in an upright position, perpendicular to the strata, the ends of the stems are seen on the surfaces of the layers, to which they give a peculiar dotted appearance, from which the rock has derived its name

BIRDSEYE LIMESTONE,

and by which, as well as by its characteristic color and fracture, it is easily recognized.* It is a valuable rock for economical uses, as it is a good building stone, and dresses well under the chisel; and it is quarried to a considerable extent at various points in the Mohawk valley.

The only fossils of this rock, beside the peculiar plant above mentioned, are an *Orthoceras* (Fig. 5) and a few species of coiled and spiral shells, not common, and generally obtained only in bad preservation.

To the Birdseye limestone succeeds a thin mass, amounting in all to only ten or twelve feet, but classed as a distinct rock from being marked by having a somewhat peculiar mineral character, and containing a peculiar set of fossils. It is a dark, thick-bedded, compact, hard limestone, fine-grained and taking a high polish, and is worked as a black marble at Glen's Falls on the Hudson, and at Isle La Motte on Lake Champlain. It is also well seen at Watertown, Jefferson County, in the river banks, from which locality it has been named the

BLACK-RIVER LIMESTONE.

In the last named place it is lumpy and irregular in texture, and not fit for good masonry or marble; and is known among the quarrymen as "the seven-foot tier." In the Mohawk valley it seems not to have been deposited except in a few places, the Birdseye being generally covered directly by the Trenton limestone.

The most abundant and remarkable fossils of this rock are

* Fig. 4 represents the general appearance of this fossil as seen on the broken edges of the layers, where its upright stems are visible.

different species of ORTHOCERAS, and other shells of similar character. This family of shells is a very peculiar one, found only in the older or palæozoic rocks, and thus are characteristic fossils of the earlier periods of geölogic history. They are, and have long been, entirely extinct, and their structure is only understood by comparing them with the NAUTILUS* now found living in the seas of warm climates. The *Nautilus* is a coiled shell, which, instead of being open within in one long spiral cavity like a snail-shell, is divided into many chambers by a great number of shelly partitions. These are formed by the inhabiting animal, which is a mollusc of high organization, much like the cuttlefish or squid. As it increases in size, and requires larger room for its accommodation, it constantly adds to its shell at the enlarging mouth, and cuts off the inner spaces from which it withdraws by walls of shell. Thus in time, a long series of chambers, scores in number, is formed, each larger than its predecessor as we examine them in order from the centre through the enlarging coil. The whole series are perforated by small apertures near the centres of the partitions, through which there passes a long membranous pipe or tube (known as the "siphuncle"), extending from the animal living in the outer chamber to the innermost apartment at the centre of the coil. It is believed that this series of empty chambers acts as a buoy, by which the tenant is enabled to float at will at the surface of the sea.

(A recent shell of a Nautilus of the umbilicated species, nearly allied to the Pearly Nautilus, lies in a case with some fossil shells of similar nature in a window on the north side of the Hall; one of its sides being partly removed, to allow the internal structure to be plainly seen.)

The Orthoceras resembles the Nautilus, except that instead of being coiled up in a circular form or disc, the shell is extended in a straight line, forming a long and tapering cone. In many specimens, when broken, the separate chambers and the mark of the connecting siphuncle are plainly seen. They are very various; some being plain, or marked only with fine lines either running circularly round the shell, or crossing each other at right angles; others being covered, as if for ornament, with protuberant knobs or rings: some are very long and slender, others are

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* The *Pearly Nautilus* is the shell spoken of: the thin "Paper Nautilus" is an entirely different form.

short; some have a narrowed or contracted portion of the outer chamber, others are swelling or pear-shaped. Other species of allied genera are curved into hooked or crescent-shaped forms; others still into circles or discs, thus approaching the form of Nautilus. The partitions of the chambers also vary; some having only a simple curve, others a waved or sinuous form: in some, as in the discoid genus called GONIATITES, the edges of the partitions have an indented or zigzag outline. In rocks newer than the coal, forms of straight and coiled shells allied to Orthoceras and Nautilus ("*Baculites* and *Ammonites*") are very abundant, but in them the edges of the interior partitions are curved and plicated into every degree of intricacy; and looking at the whole series of variations, it would seem as if there had been a purpose to show every possible change in the arrangement of one general plan or type. The siphuncle, or tube connecting the chambers, is sometimes central, and sometimes lies against the inner or outer wall of the shell.

Of all these many varieties of one leading form, the straight ORTHOCERATA with simple partitions characterize the Palæozoic rocks, as few or none are found above the Coal. The GONIATITES, with zigzag partitions, are found in the upper palæozoic rocks and in some higher strata; the AMMONITES, and other forms with plicated partitions, are found only in rocks between the Carboniferous and Tertiary. The simpler coiled forms, like Nautilus, are found in rocks of almost all periods. Less than half a dozen existing species of chambered shells are now known, all of them inhabiting tropical seas; but the extinct species of the rocks are numbered by thousands, and are found in every latitude (one of many facts which seem to prove that the temperate and arctic zones were once far warmer than they are now). Some of the ORTHOCERATA are no larger than a pencil, while others are found in the Birdseye and Black-river limestones ten feet in length; one of which size lies in the Curator's room. Ammonites are also found in the English chalk rock, as large as a wagon-wheel.

The nature of these shells has been explained thus at length, as they are among the most abundant and conspicuous fossils of all the rocks of New York. Fig. 5 represents an *Orthoceras* from the Birdseye limestone: others are figured in woodcuts illustrating fossils of the higher rocks. The Black-river limestone contains, as has been said, a large variety of these shells, not only of the straight Orthocerata, but one or two coiled forms. Speci-

mens of both are in the cases, but it is not necessary to describe particularly the peculiarities of each species.

Above the Black-river limestone (or, where this is absent, lying upon the Birdseye), we find one of the most interesting repositories of organic remains in the State; a thick series of limestones, usually black and fine-grained with thin seams of slate toward the lower part, but grey and crystalline near the top. They attain to an entire thickness of more than three hundred feet, and, succeeding the lower rocks as already described, their edges surround the great Adirondack region in an almost unbroken circuit, traceable (in connection with the lower limestones) on the State Geological Map by a belt of blue. Seen along the Mohawk at Fort Plain and elsewhere, at Glen's Falls on the Hudson, on the west shore of Lake Champlain, at the Thousand Islands and Kingston on the St. Lawrence, they also extend up the valley of the Black River, and are crossed by the West-Canada Creek at Trenton Falls, from which place they take the name of the

TRENTON LIMESTONE.

In many places, they furnish building stone of excellent quality. The State Lunatic Asylum at Utica, and the Cathedral of Montreal, are built of the grey variety of this rock.

The same series of limestone strata are seen at many points on the Lower St. Lawrence, one of which is at the Falls of Montmorenci near Quebec. Westward, they may be traced near the Bay of Quinte and onward by Lake Huron, Green Bay, and across Wisconsin to the Mississippi. There they are increased by an upper set of strata (not known at the east), called the Galena limestone, from the large caverns and crevices of which the lead ore of Iowa, Wisconsin and Illinois is obtained. Strata of the same age with the Trenton limestone, probably a continuation of them, are known west of Lake Winnipeg. Southwestward the Trenton limestone and the succeeding Hudson-river group are known in Tennessee, Missouri, and even Texas: they appear in Kentucky and Ohio, covering the country round Cincinnati (where they are known as the "Blue limestone"); and their edges may be traced along the great Alleghany chain from Pennsylvania southward to Alabama, in all which region, however, they are much broken up and distorted in position, while their fossils are less numerous and distinct than in New-York.

The Trenton limestones contain enormous quantities of organic remains, which may be collected in more or less perfection wherever the rock is exposed in ravines or cliffs. Many of them, however, are much broken and imperfect. This is especially true of the TRILOBITES, of which this rock contains about a dozen species, varying in size from the TRINUCLEUS, no larger than one's finger nail, to the large ISOTELUS or ASAPHUS, which sometimes attains the length of a foot.

These TRILOBITES, which are among the most numerous and characteristic fossils of the palæozoic rocks. and which, from their peculiar appearance, so unlike any still living form, have been the object of so much curiosity and study, were creatures belonging to the great class of CRUSTACEA, or animals covered, insect-like, with a jointed crust or armor. Of this class the common crab and lobster are familiar examples, and the *Limulus* or "Horsefoot" of the Jersey shore is another, which bears a closer analogy to the trilobites.

The various species (of which several hundred are known) possess essentially the same prominent features, but differ widely in the proportion and arrangement of their parts. These consist, first, of a broad arched plate or shield covering the head, not unlike the buckler of the "horse-foot crab." This buckler is divided by several joints or "sutures" in directions which vary in different genera, the most marked being those which separate its lateral portions or "cheeks" from the central part. Though these are not often visible, and appear in any case only as faint lines running across the buckler, we very frequently find specimens in which they have separated, leaving the parts detached.

On this "head" or "buckler" are often found prominences of various forms, the main features being usually a central and two lateral elevations; though in some species, such as the large ISOTELUS or ASAPHUS of the Trenton limestone, these are obscure, and the head forms almost a single flat arch. On the lateral elevations are placed the eyes, which are generally very conspicuous. In some genera, these are simply smooth prominences, without perceptible markings; but in others, especially the Genus PHACOPS, they show most distinctly a large number of lenses arranged on a crescent-shaped elevation, being in fact a compound eye, such as is found on many Crustacea at the present day, and resembling that of such insects as the dragon-fly. This

structure is plainly shown in one of the cases of the Hamilton group, where a *Phacops bufo* is placed under a magnifier which distinctly exhibits the eye and its lenses.

The middle portion or back of the trilobite is covered by a series of jointed armor-like scales or ribs, extending from side to side, and so articulated as to allow of great flexibility; many species having had the power to roll themselves up into a globular form, in which condition they are often found fossil. These ribs or articulations vary in number from six to fifteen or even more.

The posterior extremity is covered by a single plate, sometimes small, at other times nearly equaling in size that covering the head. It is in some species nearly smooth, but is more generally marked with transverse furrows like those separating the ribs of the body. It sometimes terminates in one or more sharp spines; and such indeed in a few species are found at the corners of the bucklers, at the ends of the articulations, and even over the whole surface of the shelly covering.

All the Trilobites are marked by two furrows running from front to back, dividing them apparently into three lobes, whence they have their general name. The whole family have been extinct since the Carboniferous period, and from that time few forms are found bearing any resemblance to them. One of the living CRUSTACEA most analogous to them is the *Limulus* or "Horse-foot;" a specimen of which lies in the case with the trilobites of the Trenton limestone to illustrate their structure. They appear to have possessed but very slight and perishable feet or paddles; as among all the thousands of specimens which have been found, no trace of these organs has been discovered. The readiness with which the ligaments connecting their different plates decayed, allowing these fragments to fall asunder before being fairly buried in the sediment, explains the fact that we find so few of them in a perfect and unmutilated form; and it is not improbable that many of the pieces we find belonged to cast shells, which may have been annually shed by the growing trilobites, as the coverings of the lobster and limulus are now thrown off and renewed every year.

The most abundant species in the Trenton limestone are the *Isotelus gigas*, a remarkably large form; and the *Calymene senaria*, a small one, fragments of which are seen in almost every block at Trenton Falls. Another very peculiar species is the *Trinu-*

cleus concentricus, a little trilobite which has a semicircular buckler marked with three bold prominences or swellings, and a large number of dots or depressions around the border, with a spine on each corner; its body being less in size than the buckler itself (Fig. 10, No. 1).

In Fig. 6 is a woodcut (No. 1) of the large *Isotelus gigas*. In Fig. 7 are illustrations of several forms: No. 1 is a very rare one, *Illænus trentonensis*; No. 2, a very common species, *Calymene senaria*; No. 3, a small and rare species, *Illænus latidorsata*; No. 4, a small living crustacean from the Antarctic seas at Cape Horn, introduced as somewhat similar to the trilobites; Nos. 5 and 6, parts of the heads of two rare species, No. 5 having lost all but the central part, and No. 6 having lost the margins or "cheeks;" No. 7 is the head only of the little *Trinucleus*, common in many localities, (shown in a perfect condition in Fig. 10.)

This rock also contains many species of ORTHOCERATA, which in some places almost cover the worn surfaces of the strata; and a very handsome coiled chambered shell about two inches across, the *Trocholites ammonius* (Fig. 8, No. 1). There are also several species of BELLEROPHON, a small coiled shell with a flaring or trumpet-shaped mouth; one of which has the mouth curved or deeply indented at the middle, dividing the edge of the shell in two projections, whence it is called the *Bellerophon bilobatus*. It is one of the commonest and most characteristic fossils of the rock. We find in it also other varieties of coiled shells of other genera: MURCHISONIA, coiled in a spiral form; and PLEUROTOMARIA, coiled more flatly, like a snail-shell (Fig. 8, No. 2). A very large number of small bivalves also occur, the most abundant of which are different kinds of BRACHIOPODA, the general nature of which class was explained in speaking of the Chazy limestone. They are of various genera: LEPTÆNA, ATRYPA, RHYNCHONELLA, ORTHIS, STROPHOMENA, etc. etc. (*Leptæna deltoidea* is shown in Fig. 6, No. 3).

The Trenton limestone also contains several CRINOIDS, which are exceedingly rare in a state approaching perfection, though short pieces of their stems are common, and their separate discs most abundant. The "CRINOIDS" are animated forms of a very remarkable character, organized in many respects like an Echinus or "Sea-egg," or like a Star-fish; but generally bearing clusters of arms or jointed appendages at the summit, and attached at the base by a long jointed column or stem to the ground. This

gives them a general resemblance to a lily, whence they were often called stone-lilies; but it is very rare that a specimen is found in a complete state. Short pieces and separate joints of the stems and arms are very common: the body is not often preserved in a perfect condition. The most perfect specimens in the collection are from the Lower Helderberg limestones, and are in the cases belonging to those rocks. A figure of a beautiful and characteristic species is given hereafter in describing the Portage group (Fig. 39.) A fragment of a single starfish has been found and figured; its name *Palæaster matutina*, being given in reference to its being the earliest of its race yet known.

CORALS are numerous, generally of small size. One species (*Chætetes lycoperdon*) is very abundant (Fig. 6, No. 2). It is a low rounded form with a flat base, and would not be suspected as a coral by a casual observer; but when broken, the columns of which it is composed are plainly seen radiating from the centre of the base to the convex side. A few branching corals are found also, and several species of another form, conical and slightly curved like a horn. In these last, a single animated inhabitant or zoophite lived in the cup-shaped cavity of the larger end; while in the other forms, each coral was inhabited and formed by a large community of tenants. (Corals of the single-celled forms, not unlike those here referred to, are illustrated in figure 31.*)

Next in upward succession lies the

HUDSON-RIVER GROUP,

an enormous mass of sandstone, slate and shale,† in the eastern part of the State 1500 feet thick or more. It is well seen in the north of Oswego, south of Lewis, and middle of Oneida; also through the Mohawk valley, and on the Hudson river, from which it takes its name. West of Schenectady it is generally level and undisturbed; but near the Hudson its strata are upheaved, broken, and crushed in every conceivable manner, as

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* These "Corals," as they are commonly called, include forms of very various nature; most of them being like the "Reef-coral" of the present day, built by "radiated" animals which live in the separate cells; but the animals which inhabit many of the smaller forms are more nearly allied to Mollusca, and are termed BRYOZOA.

† A SHALE is a soft slaty rock, but of less fissile and thin-bedded character than a pure SLATE; generally breaking with a rough fracture, and often approaching in character to a hardened clay.

is well seen in many places near the Cohoes, and along the Hudson-river Railroad. In much of this disturbed region the rock has been changed in texture by the forces to which it has been subjected, and fossils are very rare.

The same formation may be traced, overlying the Trenton limestone, northwestward to the Mississippi (where, however, it is thin and not conspicuous), northeastward to the Lower St. Lawrence, and southward along the Appalachian ranges as far as Eastern Tennessee and Alabama. It is in its western extension very calcareous, forming most of the great series of the "BLUE LIMESTONE," so called, near Cincinnati.

The lower part of this formation is a fissile black slate about 75 feet thick, called in the State reports the

UTICA SLATE.

Its most marked fossil is the *Triarthrus beckii*, a small trilobite, which in many localities is very abundant. It is usually found in fragments, and crushed flat by the settling or consolidation of the deposits in which it lies buried (Fig. 9, No. 1).

The higher strata, to which the name of the HUDSON-RIVER GROUP is more usually restricted, are brownish slaty masses, with some coarse sandstones especially toward the top, and in some places, near the summit of the group, a coarse sparry limestone. The fossils are in great part bivalve shells, including a number of elongated forms not very unlike the "freshwater muscles" of our lakes (Fig. 11).

Some ORTHOCERATA also occur; and some of the same Trilobites known in the Trenton limestone are found occasionally in this group also, among them the *Isotelus* and *Trinucleus* before described. The coiled shell TROCHOLITES is also found here, but is not common. There are many indistinct remains of seaweed, and a great variety of GRAPTOLITES, which are a very peculiar and as yet little understood family of animals, apparently related in some way to the modern "Sea-pen," or to some of the Bryozoa. They are peculiar in their appearance, usually occurring in fragments as straight black stems about one-tenth of an inch wide, having serrated edges; but Prof. HALL has found in the northern extension of this group of rocks near Quebec, more perfect specimens showing that these stems branched or radiated from a com-

mon centre, and were connected like the ribs of an umbrella by a membranous or horny film. The whole family of Graptolites is extinct, and their fossil remains characterise the older formations, to which they are confined with few or no exceptions.

(The eastern part of New York and the western part of most of New-England are formed of an enormous mass of upheaved and bent strata of slates, sandstones and limestones, which Dr. EMMONS has always maintained to be of lower position and older date than the Potsdam sandstone; and he has described them in his reports as the TACONIC SYSTEM. This range of rocks contains very few or no fossils in most localities, and geologists have been obliged to examine it without the aid which fossils would have given in explaining the relation and true position of its confused and contorted strata. The general conclusion has been that this series of strata is not a separate and distinct one, but merely the eastward extension of the rocks older than the Medina and Clinton groups, changed in character or "metamorphosed" by the effect of heat and pressure. But some recent discoveries, in a few localities of this "Taconic" range, have brought to notice fossils from them, so differing from forms previously known, as to indicate that these strata are indeed a distinct and separate series. The opinions of some of the most competent geologists seem therefore inclining to the views of Dr. EMMONS; and there seems to be a probability that it may be yet recognized as an older series of rocks, lying beneath the Potsdam sandstone, and preserving in its fossils the relics of the earliest period of living things. Others, however, adhere to the belief that these fossils show merely a local development of a portion of the Hudson-river group, with a peculiar set of fossils. There are great difficulties as yet in reconciling the apparently contradictory appearances which these rocks present; and the question is so obscure, that differences of opinion may well exist till further observations are made.)

The Hudson-river group is covered in many places by a bed of conglomerate rock, made up chiefly of coarse sand and worn and rounded pebbles of quartz. Being well developed in Oneida county south of Utica, it has received the name of the

ONEIDA CONGLOMERATE.

In Central New York it is but a few feet in thickness, and indeed seems to be entirely wanting in many places; but on the Hudson it swells to a thickness of several hundred feet, and forms the Shawangunk mountain near Rondout. From this place its upheaved edges may be traced in the range of hills southeast of the Delaware and Hudson Canal, and the same rock forms most of the mountain range of the Kittatinny or Blue Ridge, along which the Delaware flows from where it leaves New-York to where it breaks through the barrier at the famous Water Gap. From this point, its edge ranges southward to Virginia. No fossils have yet been discovered in it: indeed the rolled and worn condition of its materials would indicate that it was formed under agitated waters, which would not allow the growth or preservation of organic forms.

The source from which such enormous quantities of rolled pebbles of quartz could have been derived, and the mode by which they could have been spread so widely on the ocean bed, is a very obscure question in geology. (Several other such formations of conglomerate are known, two of which occur at the lower and middle parts of the great CARBONIFEROUS SYSTEM, of which we shall speak hereafter.)

The next succeeding series of strata are those known, from a locality in Orleans county where they are well seen, as the

MEDINA SANDSTONES.

They are a huge mass of sandy and shaly rock, of very variable hardness from soft marl to hard sandstone, and varying in color from deep red to olive and light gray. They are not known in the far West, seeming to thin out and disappear before reaching Wisconsin, but are well seen on the Niagara river, where they form most of the precipice near Lewiston. At this point the lower part is a soft red shale, with harder and lighter-colored layers above, to one heavy bed of which the cables of the Lewiston suspension bridge are fastened. These sandstones may also be seen in the lower part of the river cliffs, extending as far up as the upper Suspension Bridge. The same rocks are quarried near the lower town of Lockport for building and flagging stone, and they form the lower falls of the Genesee at Rochester, at the top of which the uppermost hard layer, called the "GRAY BAND,"

is very conspicuous from its light color. Further east, the same rock forms the falls of the Oswego river at Fulton; but in the Mohawk Valley it thins out, and becomes wanting. In South-eastern New-York, however, it re-appears; is very thick at the Delaware water gap in New-Jersey and Pennsylvania, reaching, in the latter State, the thickness of 1000 feet; and it may be recognized as far south as Alabama.

The fossils of this rock are few, the most abundant and curious are FUCOIDS, or Seaweeds, one of which, the *Arthrophycus harlani*, is known from the Niagara frontier to Virginia, and easily recognized from its conspicuous and peculiar form (Fig. 13). There are also a few small shells (Fig. 14).

Above the Medina sandstone lies a series of sandstones, limestones and shales, called the

CLINTON GROUP,

from one of the localities where they are well seen, the vicinity of Clinton, Oneida county. This group of strata is hardly distinguishable east of Fulton county, appearing to thin out in the eastern part of the State, where it is all sandstone and greenish shale. At the west, however, it contains two distinct layers of limestone and two of greenish shale, which can be well examined above the lower fall of the Genesee. Two thin strata of iron ore are found in this group, and are extensively quarried in the vicinity of Clinton: the ore is of a peculiar granular appearance almost like small shot, and contains many fossils of small size.

On the Niagara river, the upper limestone of this group is about twenty feet thick, and a very solid, massive rock; projecting conspicuously from the eastern precipice somewhat more than half way down from the top at the Suspension Bridge. At the Falls, this layer is near the level of the water.

This group of rocks extends westward through Canada, but does not appear beyond Wisconsin as a distinct mass. As has been said, it is not found in Eastern New-York, but re-appears in Pennsylvania in enormously increased thickness, amounting to nearly 2000 feet, and extends southward along the Appalachian chain even to Eastern Tennessee. It seems everywhere to contain beds of iron ore of the same character with those in New-York, which are known in Pennsylvania as the Catawissa ore, and are worked for the Montour iron furnaces; though in the far

western extension of these strata in Wisconsin, this mineral is perceptible only in very small quantity.

Some very curious and interesting markings have been found on the surfaces of sandy layers of this rock in Oneida and Herkimer counties; appearing to be the tracks or trails of shellfish or some other humble form of life, which crawled over these sands, perhaps while exposed just above the water level by the reflux of the tide, which on its return washed over them another film of sediment which preserved them through all subsequent changes until now. Specimens of these trails are in the cases, and are figured in the second volume of the Palæontology. It is one of the strangest of facts, that what we consider the most striking symbol of evanescence, a track upon the tidewashed sand, should thus become an imperishable record. (Other instances of the same nature are known, one of which is the existence in strata of the Connecticut sandstone, a rock of far more modern age, of tracks of wading birds like snipes or herons, some of them being of great size; doubtless imprinted on the beach laid bare by the tide, or in shallow waters, where this rock then existed as a soft bed of sand. Large slabs of this rock, with such impressions, are in the upper story of the Museum.)

The fossils of the Clinton group are quite numerous, but not generally so marked as to be described with interest in a general sketch like the present. Many of them much resemble those of the succeeding rocks; the most characteristic being a large bivalve brachiopodous shell, the *Pentamerus oblongus*, common below Rochester. It is oval and somewhat flattened in form: the internal structure, which can be seen in some specimens, is peculiar, but not explainable without plates. This shell is a peculiarly interesting fossil, as it is known to spread, in strata of similar age, from Europe to the west of the Mississippi; a marked instance of the wide extension of a single form in the ancient ocean. Its general form is shown by the figures in the woodcut 14*a*.

To the Clinton group succeeds the

NIAGARA GROUP.

The observer, standing on the upper Suspension Bridge, sees in the precipice, above the Clinton limestone, a sloping bank of soft grey shale about eighty feet thick, above which follows a thick

series of layers of limestone forming the brink of the rocky wall: these are the Niagara shale and the Niagara limestone. The great cataract pours over their edges; and its peculiar form, so like a huge dam, is owing to the fact that the soft shale below wears away more rapidly than the hard limestone which forms the top of the fall, thus maintaining a hollow space behind the descending sheet.

These rocks are perfectly exhibited in the ravine of the Niagara, especially along the Niagara and Lewiston railroad. The shale decomposes rapidly where exposed to the air, until it resembles a bank of grey clay. It contains thin layers of limestone in many places, the surfaces of which are often covered with beautiful small corals of several species, and the shale itself contains them in great numbers. The best locality for fossils has been at Lockport, where they are more numerous than on the Niagara, and where, during the construction of the double locks, great quantities of the shale were excavated. The "deep cut" of the canal above Lockport is through the Niagara limestone, some layers of which there form a massive and beautiful building stone. The same limestone and shale form the upper falls of the Genesee at Rochester; and in the precipices below, fossils are common.

The limestone is at Niagara about 160 feet thick (of which only the lower part is seen just at the Falls); at Rochester, about 70 feet only. It forms the summit terrace of that remarkable range of hill known as the Mountain Ridge or Queenston Heights, extending from New-York through Canada West: it can be seen in the Manitoulin islands on Lake Huron; also south of Green Bay, and across Wisconsin and Iowa. (On the Upper Mississippi, the Medina sandstone does not exist, and the Hudson-river group is thin and so inconspicuous as to have been overlooked by the earlier observers. They thus found the Galena or Upper Trenton limestone apparently joining the Niagara limestone, and both were described as one rock under the name of the UPPER MAGNESIAN LIMESTONE, an error which has been corrected by more careful examination.) It exists also in Ohio and Kentucky, where it forms the lower part of what is there called the CLIFF LIMESTONE. Eastward from Rochester, the Niagara group gradually thins out, its limestone being traceable to the Mohawk valley, and a few of its layers even farther: it is not distinctly seen in Pennsylvania.

The fossils of this group are numerous and very marked. Corals are in great numbers, many beautiful small branched forms being found in the soft shale; some of which, showing merely in dark films like pressed plants, would hardly be thought corals by an ordinary observer (Fig. 15): others, in the limestone, are in flattened columnar masses like honeycomb; others still in rounded forms, and the structure is often so minutely preserved as to be visible only with a magnifier. One very peculiar coral is the CATENIPORA, the name of which implies "chain-like cavities." Its cells or tubes are oblong, and are arranged in rows, so that when broken across, their section resembles the series of links in a chain. This species of coral is found in the same rock as far west as Louisville, Ohio; and the same, or a closely similar form, is found in strata of similar age in Northern Europe.

Half a dozen species of trilobites are found in the Niagara shale; the small *Calymene senaria* (Fig. 16, No. 3) being scarcely distinguishable from the similar form in the Trenton limestone: indeed, it is not certain but that they are the same; if so, it is a very remarkable instance of the long endurance of a single species. A large elongated trilobite, with the lobes of the back so obscure as to be hardly perceptible, is also found (the *Homalonotus delphinocephalus* (Fig. 17); likewise the *Lichas boltoni*, a very large and handsome species, broad in proportion to its length, and with the ends of the ribs extended into points.

Some of the most perfect crinoids known are found in this rock, which (as well as its other fossils) are beautifully figured in the State Palæontology of Prof. HALL. A very common one is the *Caryocrinus ornatus;* the globular head, or body, made up of many angular plates, being the part usually found, having lost its stem and the jointed arms which stood on its summit (Fig. 18, No. 1, 2).

A small but perfect star-fish has been found in this rock, and a great variety of small brachiopodous shells abound in many of its localities. All are figured in the State Palæontology.

The next series of strata in upward succession are very deep beds of shale, slate, and thin limestones, the whole of which in Central and Western New-York attain the thickness of nearly a thousand feet. Its lower part in Central New-York is composed for several hundred feet of a soft red shale or hardened clay, especially conspicuous along the canal in Madison county. Its

upper portion is generally a gray slaty rock, with layers of impure limestone, well seen along the Auburn and Syracuse railroad. The important Salt Springs of Salina being situated in these rocks, they have received the name of the

ONONDAGA-SALT GROUP.

The salt has not hitherto been found in solid masses, though the gray part of the rock in some places shows impressions of the peculiar "hopper-formed" crystals of this mineral, proving that it once existed there in small quantities. It is probable that it is diffused in small proportion through large extents of these strata, through which (as they are very permeable to water) the rains percolate, and bear the salt in solution to the deep basin at Salina. This is found by boring to be several hundred feet in depth, filled with gravel and sand, in which the salt water seems to lie as in a reservoir, and from which it is raised by the pumps for the supply of the evaporating works. The Onondaga lake, which is a comparatively shallow body of fresh water, lies over this deep mass of gravel, but has a water-tight bottom of marl which keeps its waters separate from those below. Such is the generally accepted explanation of the Onondaga salines; yet the question as to their sources is somewhat obscure.

The upper drab or gray slates of this group contain great quantities of gypsum, which is quarried extensively from Madison county westward. The rock over the masses of gypsum often seems arched, as if this mineral, in forming, had exerted an upward pressure, lifting the overlying masses.

The whole group is remarkably destitute of organic remains; not a single fossil having been found in the lower part or red shale, and but a small number in a few localities of the upper portion. The most remarkable of these is the EURYPTERUS, a very curious crustacean, with a semicircular head, a long jointed body and spinous tail; having several antennæ or "feelers" about the mouth, and one of its pairs of feet flattened into broad blades like oars or paddles, doubtless used in swimming. It is a rare fossil, found as yet only at Williamsville in Erie county, and near Waterville in Oneida county and Litchfield in Herkimer county; but there is no doubt that more general search will yet discover specimens in many other places. It is found in the upper part of the Salt group, in the thin layers not far below the base of the succeeding Waterlime group.

In Canada West, near Galt, there is a limestone believed to belong to this group, but which seems not to have been formed in New-York, which contains some remarkable fossils, especially some large bivalve shells named by Prof. HALL, MEGALOMUS, specimens of which are in the cases.

The Onondaga-salt group is hardly seen east of Herkimer county, though in Pennsylvania it seems to re-appear, but without saline springs. Westward it extends to Iowa, but there contains no useful minerals and few fossils.

Above the Salt group succeeds a thick series of strata, chiefly limestone, but with one or two sandstones among them, known under the general name of the HELDERBERG ROCKS, as they form the great escarpment of the Helderberg hills in Albany county. From this place their edges may be followed in the hills lying back from the Hudson, along the base of the Catskill mountains, and through Ulster county as far as Kingston and Rondout; whence they bend southward and extend along the hills west of the valley of the Delaware and Hudson Canal, passing out of the State near the northwest corner of New-Jersey. They run still farther southeastward, are seen above the Delaware water-gap; and their lower strata are traceable in the Appalachians as far as Tennessee, though their upper limestones do not extend beyond the Susquehanna. In following them westward, we find their lower limestones and sandstones thin out rapidly, not extending beyond the Niagara in any considerable thickness, while their upper limestones are found spreading into the far west.

This series of rocks may be divided into four portions; the WATERLIME GROUP, the LOWER HELDERBERG LIMESTONES, the HELDERBERG SANDSTONES, and the UPPER HELDERBERG LIMESTONES. Lowest lies.

THE WATERLIME GROUP

of Central New-York, a succession of dark-colored, usually fine-grained and straight-bedded limestones, attaining in Madison county the thickness of over 100 feet. They lie immediately over the grey and drab limestones of the upper part of the Salt group, and are not divided from them by any very distinct or sudden change in the appearance of the strata. Their name is given from the water-lime or hydraulic cement which is extensively manufactured from two of the layers toward their upper

part : these are generally of a drab color, and separated from each other by a thin mass of blue limestone. They are quarried, burnt and ground on a very large scale near Manlius in Onondaga county, and the hydraulic cement of Rosendale and Rondout is probably made from the same beds. (That manufactured at Williamsville, Erie county, is from the upper limestones of the Salt group below; and in Niagara and Orleans counties, a similar cement is made from some layers of the Niagara group.)

The fossils of the Waterlime group are but few : the most abundant is the *Spirifer plicata*, a little brachiopodous shell which often occurs in great numbers in some grey slaty layers of the rock (Fig. 19, No. 1); CYTHERINÆ, which are shells of a minute crustacean, appearing as smooth black oblong shells, very common in many places (Fig. 19, No. 6); and TENTACULITES, small conical bodies like spines, ornamented with rings the nature of which is not well understood, though they are believed to be shells once inhabited either by floating marine mollusca, or by marine worms allied to the SERPULA (Fig. 19, No. 3). A LEPTÆNA, a thin brachiopodous shell marked with fine radiating lines, is abundant in many localities.

The Waterlime group is succeeded by what are called the

LOWER HELDERBERG LIMESTONES,

described in the District reports as the Pentamerus limestone and Catskill shaly limestone, the former mass being the lower : it is a coarse-grained, thick-bedded and often concretionary limestone; while the Catskill limestone is in thin layers, with much shaly or slaty matter interstratified with it. Both of these limestones thin out rapidly to the west, and are not recognisable west of Madison county, though at the Helderberg they are eighty or an hundred feet in thickness. They may (with the Waterlime group) be traced through Pennsylvania and Virginia, but are very thin and not found in all places, seeming to be interrupted, and were probably deposited only here and there in areas of no great extent.

The fossils of the Lower Helderberg limestones are very numerous and interesting, and, with those of the Waterlime group below and the Oriskany sandstone above, fill the third volume of the State Palæontology. A few of the most common and characteristic are *Rhynchonella ventricosa* (Fig. 20), *Pentamerus galeatus* (Fig. 21, No. 1). *Lepocrinites gebhardi* the stem of a crinoid

(Fig. 21, No. 4), *Delthyris macropleura* (Fig. 22, No. 1), *Merista lævis* (Fig. 22, No. 2), *Eatonia medialis* (Fig. 22, No. 4), and the two *Strophomenæ* (Fig. 23). There are several trilobites, and some very beautiful and perfect encrinites have been found in these strata in Schoharie and Herkimer counties.

The chief of the Helderberg sandstones is

THE ORISKANY SANDSTONE,

which overlies the Lower Helderberg group, is, at Oriskany Falls, whence it derives its name, a light coarse sandstone about twenty feet thick. In localities further west, it is sometimes, as at the falls of the Chittenango creek and at Split Rock near Syracuse, either wanting or represented only by a few inches of dark sandy rock; sometimes, as between Elbridge and Skaneateles, thirty feet thick; and in other localities, of various intermediate thicknesses. Near Schoharie, it contains some lime with its sand, and is light colored; in some parts of the Helderberg, as near Clarksville and Knoxville, it is only a foot or two thick, a hard black stratum full of fossils. In Pennsylvania, it is from 150 to 300 feet in thickness, and contains the same organic remains which are found in it in New-York. But the finest fossils yet discovered in it are near Cumberland in Maryland, where the crumbling texture of the rock causes it to decompose, often leaving the shells as perfectly free from adhering matter as those of the seashore; so that every detail of internal structure, as well as external form, is perfectly seen.

The fossils of this rock are numerous, some sixty species being described in Professor Hall's third volume. Among the most characteristic are those shown in figures 24–25. The forms in Fig. 25 are *internal casts*, or moulds of the interior of the shells, formed by the sand which filled them; the substance of the shell itself having decomposed. These "casts" are very abundant, and give rise in the mind of unlearned observers to many fanciful resemblances, such as "butterflies," "colts-tracks," etc. etc.

Above the Oriskany sandstone, in the Helderberg region, is a mass of sandy slate or shale, often more than fifty feet thick; but it is not known west of Herkimer county. In Pennsylvania, it is seen from the State line to the Water-gap. It forms, by decomposing, a poor soil; and is equally barren in fossils, the only form known being what is called the *Cocktail fucoid*, supposed to be the remains of a marine plant, the form of which re-

sembles the peculiar plumage from which it is named. The abundance of this fossil has given the rock in which it lies the name of "COCKTAIL GRIT."

Upon it lies the SCHOHARIE GRIT, a thin mass, being usually only four or five feet of hard calcareous sandstone, which, when freshly quarried, looks like a grey limestone, but when long weathered, loses its carbonate of lime and becomes a gritty yellowish sandstone. It is found only from Cherry-valley eastward, extending round the front of the Helderbergs and along the hills west of the Hudson, but does not appear to be known in Pennsylvania. Its fossils are numerous and conspicuous: among them may be noticed one or two Trilobites, several Orthocerata, and many smaller shells; of which we cannot furnish illustrations. They are figured in the third volume of the State Palæontology, and many of them are in the cases in the Cabinet.

THE UPPER HELDERBERG LIMESTONES

(which lie above the Schoharie grit, Cocktail grit and Oriskany sandstone, and where these are wanting, as in Western New-York, lie immediately on the Waterlime group), are some of the most widely known and useful limestones of the State. The lower portion (usually varying from 10 to 20 feet in thickness) is generally a coarse-grained crystalline gray rock, lying in solid layers, and, when free from flint, working well under the hammer and chisel, and often taking a good polish as a marble; called, from being very extensively quarried in Onondaga county, the ONONDAGA LIMESTONE. It is easily traced from near Rondout on the Hudson to the Helderbergs, where its outcropping edge turns westward, and runs by Schoharie, Cherry-valley, Bridgewater, Oriskany falls, the falls of the Chittenango below Cazenovia, Onondaga Hill, at Split Rock, Auburn, Phelps, Le Roy, and Williamsville to Black Rock. Through nearly all this distance it preserves its well marked character, and is extensively used in building.

The upper portion of the group is what was originally called the CORNIFEROUS LIMESTONE, from its containing beds and nodules of hornstone or flint: it is usually from 30 to 50 feet thick, a bluish or grayish rock, lying in straight courses, often having some shale interstratified with it. Though these two portions of the Upper Helderberg limestone are in most places very distinct, yet in others, especially in the West, they seem to run together or

blend in one mass; so that they are now regarded only as local varieties of a single rock. They are known in Northeastern Pennsylvania, but are not very distinct there. Westward, however, they spread over a vast extent, along Northern Ohio, where they are seen at Sandusky; through Northern Indiana and Illinois, where they are quarried near Chicago; and across Wisconsin to the Mississippi, where they may be seen at and above Davenport. They also emerge from beneath newer rocks on the Ohio, where they form the Falls at Louisville, and are known in that country as the upper part of the Cliff limestone (the lower part being the western extension of the Niagara limestone; all the rocks which intervene in New-York, the Onondaga-salt group, the Lower Helderberg group, the Oriskany sandstone, and the succeeding grits, being almost or entirely wanting in that region).

The fossils of these limestones are very well marked, generally peculiar to them, and abundant. A large shell, *Meganteris ovoides*, is shown in figure 26: it is from the lower part of this rock, or the grey "Onondaga limestone." Fig. 27 shows some fossils of its upper portion, the "Corniferous limestone." No. 1 is a common trilobite, easily recognized by the "notched" edge of the head and the forked tail. No. 2 is a common coiled chambered shell. No. 7 is a fragment of a fish-bone: such are not uncommon, being more abundant at the West. The fishes from which they came were allied to the remarkable forms of which Hugh Miller wrote in his "Footprints of the Creator."*

In the Upper Helderberg group, we have the last or highest formation of limestones of any considerable extent or thickness in the State. All the southern counties, lying above or south of the line of outcrop of the Onondaga and Corniferous limestones as before described, are nearly destitute of this useful mineral; being formed of vast piles of slaty, shaly, and sandy strata, several thousand feet in thickness, whose surfaces extend from a few miles south of the Erie Canal to and beyond the Pennsylvania line.

These rocks give rise to peculiarities in the topographical

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* These limestones contain several trilobites, and many corals both of the columnar and branching forms; and a large number of the one-celled conical genera, shaped like horns of cattle; each of which was made by a single animal tenant, living in the larger cup-shaped end.

features of the country which they underlie, and in its soil and vegetable productions. Containing little lime, we find the culture of wheat does not generally succeed well upon them; nor does the central wheat-growing district extend upon them more than a few miles south of the limestone range, except in a few alluvial valleys, or places where calcareous materials from the limestone belts have been strewed over the southern slates by the DRIFT, of which we shall speak hereafter. Grazing and dairying are almost exclusively the pursuits of the farmer.

The most marked physical features of all this great extent of country consist in its deep valleys and long ridgy hills, usually extending in a north and south direction, as an inspection on any map of the rivers which follow the valleys will show. Some of these long north and south valleys having been excavated so deeply below their outlets as to retain the accumulated waters of the rains and streams, form that remarkable series of lakes beginning with the Otsego, and comprising the Canaderaga, Cazenovia, Otisco, Skaneateles, Owasco, Cayuga, Seneca, Crooked, Canandaigua, Honeoye, Canadice, Hemlock, and Conesus lakes; all so similar in their general form and direction, and in the shape and geological formation of their enclosing hills. Over the whole extent of these rocks, the country is "rolling" or broken into ridges generally running north and south, and rising from one to eight hundred feet above their main dividing valleys; and it is rarely that we find among them a plain half a mile in width, excepting in a few of the "bottom-flats" or alluvial lands along the larger rivers.

These rocks are generally quite uniform in their character, especially in the eastern part of the State near the Hudson valley, and might be grouped into one enormous formation five thousand feet or more in thickness, except for a few variations in texture, and some more marked differences in the fossils of their lower, middle, and higher portions, from which they have been separated and described under the successive divisions of the MARCELLUS SLATES, the HAMILTON GROUP, GENESEE SLATE, PORTAGE, CHEMUNG and CATSKILL MOUNTAIN groups; under which names their strata and fossils have been described in the State Reports and arranged in the State Collection.

Lowest of these divisions, resting immediately on the Upper Helderberg limestone, is the MARCELLUS SLATE, named from the village of Marcellus, near which it is well seen; a mass of dark,

fissile, short-fractured slate, one or two hundred feet in thickness, in most places containing layers of impure limestone and rounded concretions of similar material in its lower part.* These slates closely resemble those of the Coal formation, and sometimes contain thin seams of coaly or bituminous matter, which have misled many persons to spend considerable sums in digging and boring in them, with the ill-founded expectation of finding useful layers of coal : an idle hope, for they lie (as will be seen hereafter) thousands of feet below that true Carboniferous system, beneath which no valuable coal strata have ever been found.

Their fossils are usually few, those most common in the slate itself being figured in the annexed wood cut (Fig. 28). They all belong to genera which have been heretofore noticed, except the DISCINA and AVICULA. The former was a flat circular brachiopodous shell, the valves not articulated by a hinge, and with a slit or hole in the lower valve through which passed a "pedicle" or muscular appendage by which the animal attached itself to stones or other objects on the sea bottom. The AVICULÆ are bivalve shells having the lower valve much smaller than, and often quite unlike the upper, and with a wing or prolongation of the hinge-line on one or both sides. They are very numerous as fossils in the older rocks, but comparatively few are known now living. The "Pearl oyster" is one of this family.

But the limestone layers near the base of the slate contain a very peculiar group of fossils, met with in no other stratum.† They are chiefly large chambered shells, Orthocerata and Goniatites, though the latter are much like Nautilus in general form. The larger species is sometimes a foot in diameter, its outer surface beautifully marked with waving lines of growth; and broken specimens show perfectly the sinuous form of the partitions between the chambers, and the siphuncle or connecting tube

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* These concretions (found also in other slaty formations) are generally cut in various directions by veins of spar, the edges of which show on the surface in intersecting lines. The common oval form of the concretions, and a frequent approach to regularity in the veins, give them a curious resemblance to large tortoises; though they are simply concretions without any fossil character, except that fossils are sometimes contained in them. Such masses are called by the general name of *Septaria.*

† This should be understood of the layers east of Marcellus. At Le Roy and elsewhere in Western New-York, there are one or two thin layers of compact limestone, containing a few Brachiopoda and Trilobites, the latter appearing to be like the smaller forms of the Hamilton group. These layers are different from those above described.

lying close to the outside or back of the shell. Another form has partitions curved in a simple convex form, and a siphuncle placed in the interior, separate from the shell. In this species the successive volutions simply touch each other, while in the former each outer volution covers half the width of the inner one; and there is a third species, only about as broad as a half dollar, in which the inner coils are entirely covered by the outer ones.

The Orthocerata are very perfect, the more common form being a long tapering species, about two feet in its greatest length; others being pear-shaped; and there are one or two shells which seem between *Orthoceras* and *Goniatites*, being bent into a sort of crescent. These have knobs or bosses on every second or third chamber.

These fossils are found most abundantly in the lower part of the upper layer, in which they sometimes lie very thickly. A mass of this layer is placed in a separate case in one of the north windows, which contains four perfect goniatites of the species first mentioned, two or three broken ones, and several other fossils. A recent *Nautilus umbilicatus*, from the tropical seas, lies beside them, and the close resemblance in their general form is very striking.

The top of the upper layer often contains small coiled shells, probably of the Genus PLEUROTOMARIA; and a tiny trilobite of the Genus PROETUS or ÆONIA is sometimes found in the base of the lower layer. This rock also contains bones, plates and spines of fishes, which are of great interest. A few specimens are in the cases, appearing to belong chiefly to species of ASTEROLEPIS (or "Star-scale"), a thick-plated fish, nearly allied to that described in HUGH MILLER's "Footprints of the Creator." An examination of these specimens will enable the student to recognize such remains wherever he may find them; and such will be gladly received by the Curator of the Collection.

The Marcellus slate is a rock of very wide extent, being traceable through Pennsylvania, Virginia, and even Tennessee; and it is a remarkable fact, stated by Prof. ROGERS in his State Report on the Geology of Pennsylvania, that through all this distance it seems to contain near its bottom a thin argillaceous limestone; and that goniatites, of some variety, are found in this slate in Pennsylvania and the West. This limestone and its remarkable fossils have been clearly traced and examined in New-

York, as yet, only from Marcellus to Schoharie; but it is probable that they may be found well developed through the Helderbergs and along the hills west of the Hudson river and Delaware and Hudson canal to Pennsylvania. The layer is easily found, generally projecting in ravines worn in the shale not far from its base; and it is hoped that this pamphlet may stimulate some readers residing in that district to look for it, and collect its many fossils.

The Marcellus shales change gradually, at their higher part, into the

HAMILTON GROUP,

which is a harder, lighter-colored mass, often becoming a sandstone, and, in Central New-York and as far east as the Catskill range, is a thousand feet or even more in thickness. Like the Marcellus shale, many parts of it show very little marks of stratification; but it is divided perpendicularly by joints, which, where it is excavated, often show as upright and smooth as the walls or angles of a plastered building. In the more eastern part of the State, it is generally coarse-grained and sandy: in Western New-York, it is fine grained, soft, and more calcareous, forming by its decomposition a rich soil.

Taken as a whole, it is exceedingly prolific in fossils, though in some of its beds they are few. They are very various in their nature, comprising univalve, bivalve and chambered shells, corals, trilobites, crinoids, fish-bones, and distinct remains of *land plants*; being the lowest and oldest rock in New-York in which any traces of terrestrial vegetation have been found, except a few indistinct stems in the Marcellus slate (a fragment of this kind is shown in Fig. 34*a*).

Four or five species of Trilobites are known: the largest (which is common in Central New-York, but rare further west) is the *Homalonotus dekayi*; which, in general appearance as well as size, resembles the *Homalonotus* from the Niagara shale (Fig. 29). It differs, however, in the form of the head; and the plate covering the other extremity, instead of being furrowed transversely and pointed at the end, is smooth and rounded. The *Phacops bufo* (Fig. 30, No. 6) is a small trilobite abundant in many places, especially near Moscow in Livingston county, and near Eighteen-mile creek in Erie county: many specimens show

the lenses of the eyes very perfectly. The *Dalmania calliteles* is another small species (Fig. 30, No. 7): its tail is fringed with small pointed projections. Other species are exceedingly rare. Among the chambered shells is one very large coiled species, the *Phragmoceras maximus*, found near Madison in Lewis's quarry and elsewhere in Central New-York, fifteen inches in diameter. Smaller species are also found; and there are many Orthocerata, one small species of which, common in Central New-York, is surrounded with rings or swellings which have caused it to be compared to the tail of the rattlesnake, to which, in the eyes of some beginners in geological observation, its jointed structure, separating at the partitions, seems a striking feature of resemblance.

A few Asteriæ, or starfishes, have been found in this rock, but they are as yet very rare; and there is in the Collection a slab of stone containing several badly preserved specimens of something very like an Echinus, or modern "Sea-egg." These are animals bearing some relationship to the starfish, but generally of a circular or flattened-oval form, and covered with projecting spines, which are articulated to the body, and by the movement of which they walk or crawl on the sea-bottom. A specimen of a recent Echinus is laid in the case, to explain the nature of the fossil. Many more specimens of such forms will probably be discovered, when observers are so numerous as to examine all parts of the State above the limestones.

The appearance of *Terrestrial Plants* is a very interesting feature of the Hamilton group. Specimens may be seen in the cases: they are of several kinds; one is a large flattened stem; another a long stalk, marked with scale-like protuberances (Fig. 34 *a*); others are branched, like that in the figure, No. 34 *b*. Their appearance seems to mark a step in the great progress of creation, when the earth, previously bare of trees or land-plants, began to produce its first vegetable growths. The attention of observers is urged to this class of fossil remains, which may be expected to be found in considerable abundance in the Hamilton and higher groups, especially east of Seneca and Tompkins counties, west of which they seem to be less common.

The fish-bones of the Hamilton group seem generally to belong to species of Asterolepis, allied to those of the limestone of the Marcellus slate. They are as yet rare.

The Crinoids are not common in a perfect state, but scattered joints and short stems are common. (There is in Western New-

York a thin layer of limestone in the shale, which is almost made up of encrinal columns, often of large size; and is known as the Encrinal limestone. It does not extend far to the east, however.)

The Corals of the Hamilton group are chiefly of forms allied to the columnar and horn-shaped Corals of the Upper Helderberg limestones. The figure given (Fig. 31) explains their more common character. There are, however, many beautiful small forms belonging to the Bryozoa, which are found adhering to the inner or outer surfaces of shells on which they seem to have been parasitic.

The bivalve shells of this rock are exceedingly numerous. There are many species of Avicula (Fig. 32, No. 3); and many of oblong forms bearing some general resemblance to the "fresh-water muscles" of our lakes and streams, though all are of marine origin (Fig. 33). There are great numbers of brachiopodous shells, of which some of the most marked are the great Discina (Fig. 32, No. 4), and the *Atrypa concentrica* (Fig. 34, No. 5), an exceedingly common species. The *Atrypa reticularis* (Fig. 34, No. 4) is another common form, which is known through a great thickness of strata; being found in rocks far below the Hamilton group, even as low as the Clinton, (if indeed the species be identical throughout.) A beautiful bivalve shell is the Grammysia, which has its knobs or umbones curved into two coiled spires which approach each other at the hinge, with a broad furrow running from each umbo diagonally across each valve to the margin at its other end. The Nuculæ (Fig. 33, Nos. 4, 5) are small, short and thick bivalves, with the hinges marked with a long line of teeth almost like a saw, seen (like all such details of structure) best in broken or weatherworn specimens. Among the univalve shells are species of Bellerophon (Fig. 34, No. 1), explained under the head of the Trenton limestone; Pleurotomaria, small and often beautifully marked snail-like shells with a band on the outer edge; Loxonema (Fig. 30, No. 8), a long spiral form with lines crossing each whorl or coil; and Natica, a coiled shell formed much like a large snail, but wanting the marginal band found in Pleurotomaria. We may add some of the Spirifers, very long or rather wide and pointed brachiopodous shells; of which several are shown in the woodcuts (Fig. 29, No. 3; Fig. 34, Nos. 2, 3; Fig. 30, No. 5).

The Hamilton group terminates in Central New-York with a very impure dark limestone, about ten feet thick, called the TULLY LIMESTONE. In the eastern and western parts of the State this rock does not exist, and the Genesee slate lies directly on the Hamilton group. The Tully limestone contains some fossils which are common to it and lower shales, among which are the *Phacops bufo* and *Dalmania calliteles* (see page 65); and some peculiar to itself, the most marked of which is a beautiful brachiopodous shell, the *Rhynchonella cuboides*, shown in Fig. 35, No. 1. Beside the fossils in this cut, there are others; among them, a very pretty small LEPTÆNA.

The next rock in upward order is the GENESEE SLATE, a series of layers of thin-bedded fissile black slate, in some places 150 feet thick, but diminishing westward so that it is only about 25 feet on Lake Erie. It is, however, distinctly recognized in Pennsylvania, where it is some 300 feet thick, and, with the Marcellus slate and Hamilton group, forms the "CADENT GROUP" of Prof. ROGERS' Report. It derives its name from one of its best localities in this State, the gorge of the Genesee below Portage. It is generally easily recognized by its black soft slaty texture, but its fossils are very few; the more common forms being shown in the woodcut Fig. 36.

The name of

PORTAGE GROUP

has been given to the next upward portion of the great slaty and shaly masses, which form the deep gorge of the Genesee at Portage, and everywhere cover the southern edges of the Hamilton group and Genesee slates. This enormous pile of sandy, slaty, and shaly strata is in some parts of the State 1000 feet in thickness: it is divided, in Prof. HALL's Report on the Fourth District, into a lower mass called the Cashaqua shale, a middle mass called the Gardeau shale and flagstones, and a terminal mass of sandstones seen at Portage; but in Middle and Eastern New-York, these divisions are not distinct.

Much of this group is a soft olive-colored shale; but its most useful portions are its layers of flagstone, which are largely quarried near Norwich and Ithaca, on the hills back of the Helderbergs, and on those west of the Hudson river as far down as Rondout. Layers of the same character exist in this group in Pennsylvania, where it attains an enormous development, being

estimated by Prof. ROGERS at seventeen hundred feet. The group extends westward through Ohio (where it, with the succeeding Chemung group, forms what are called the Waverly sandstones); but while in Indiana it and the Chemung group together are not more than 400 feet, where it reaches the Mississippi and passes into Iowa, it and its associated rocks have so thinned out, that the whole vast series from the Hamilton to the Chemung groups (inclusive of both) are reduced from the 3000 feet of thickness which they have in Middle and Eastern New-York, to less than 200 feet.

It is generally very poor in fossils; so that in some places a whole day, spent in searching for them, is rewarded with but a few obscurely preserved shells or even none. Those described in the Report on the Fourth District are shown in Fig. 37, 38 and 39. The crinoid in Fig. 39 is one of the most perfect and beautiful which are known from the rocks of any age, and is a good example to show the general form and structure of this curious and interesting family. It has been found in perfection only in the shore bluffs of Lake Erie, in the town of Portland, Chautauque county.

The soft slates of the Portage group contain many of the concretions known as *Septaria*, described in our notice of the Marcellus shales.

To the Portage group succeeds the

CHEMUNG GROUP,

so called from being well exhibited at the "Narrows" of the Chemung river. Its thickness of 1000 or 1500 feet is made up of a series of thin-bedded sandstones with intervening shales, and occasionally beds of impure limestone mainly formed by the materials of fossil shells. It, in many places, abounds with fossils. Trilobites are very rare, as they are in all strata above the Tully limestone; and the few found in this group (apparently the same with *Phacops bufo* of the Hamilton group) are the last of their race known in America, the whole family having been extinct since before the commencement of the Carboniferous period. Plants are not uncommon, and some specimens of fern-like character plainly indicate a gradual approach to the forms so abundant in the Coal formation. The shells are chiefly bivalves, of which several illustrations are here given (Fig. 40, 41). It will be seen that they resemble in considerable degree

some forms of the Hamilton group. Many species of AVICULA occur, and brachiopodous shells of the Genera SPIRIFER, ORTHIS, ATRYPA and STROPHOMENA are abundant and beautiful.

This group of strata contains many remains of plants : most of them are very ill-preserved, but one quite perfect imprint of a fern-like leaf is shown on Fig. 41. The original specimen was found at Pine valley, Chemung county.

The Chemung group passes or changes upward into the

CATSKILL GROUP,

an enormous series of shaly and sandy strata, which cover all the upper range of the Catskills, and many of the higher tracts of the southern counties as far west as Steuben. In the latter county it is only a thin mass of calcareous sandstone, and farther west it thins out and disappears entirely; but in the Catskill region it is probably 2500 feet thick, and twice as much in Pennsylvania; whence it is found southward along the mountain ridges, but in thinner volume, as far as Tennessee.

The beds of this series are various in color, being greenish grey sandstones; fine-grained reddish sandstones, slates and shales; grindstone grits, and an accretionary mass appearing like fragments of hard slate cemented in calcareous rock. The hard sandstone often weathers in a peculiar way, dividing into thin layers almost like piles of boards.

The fossils of this rock are very few : the shells figured (Fig. 42) were found by Prof. VANUXEM in a locality near Mount Upton on the Unadilla. Remains of plants are numerous, forming occasionally tiny seams of coal; and there are in some localities many teeth, bones and scales of fishes. The latter are often conspicuous objects, as they are usually white or bluish in color, and contrast strongly with the red rock. A few specimens are shown in Fig. 43.

Above these "Catskill mountain strata," lies the rock which is considered as the base of the great CARBONIFEROUS SYSTEM of Pennsylvania. It is mainly a mass of hard CONGLOMERATE, of rolled and rounded quartz pebbles cemented with sand into a solid mass. Some of its finer or more sandy layers often show a singular lamination in a diagonal or slanting direction. It is remarkably massive and ponderous in its general appearance, the ledges often separating into huge blocks with wide

fissures between, which have been fancifully compared to ruined cities.

This conglomerate rock is found on the summits of the Catskills, and it is also known in a few places in Southwestern New-York, where, in the absence of the Catskill group, it lies on the top of the Chemung. Such are to be seen six miles south of Olean, seven miles south of Ellicottville, and near Wellsville, where they are popularly called "rock-cities." They lie on high points not far from the Pennsylvania line, and are simply remaining spots of the conglomerate left far north of the main body of the rock, by the wear of the elements, which, going on through ages of ages, has worn away this massive stratum over great extents of country. They are thus most impressive monuments to show the vastness of that wear or erosion, which has left them in this insulated position, and which may in the course of future centuries demolish them entirely.

The fossils of this rock are very few, and are found only in the finer sandy layers. Those shown in Fig. 44 were found near Panama, Chautauqua county.

This conglomerate is the highest and latest formed of all rocks known within the limits of New-York. It is possible that a few strata of later origin, belonging to the Carboniferous formation, may exist on the Catskill summits, but probably none of any considerable amount. The whole Carboniferous system, with its valuable beds of coal, appears, in its present extent, to terminate south of our State Line; and it is in the highest degree improbable that useful layers of coal can ever be found within our borders. To obtain a knowledge of the Coal formations, we must go into Pennsylvania. The following statement of the succession of its different rocks in that State is taken from the Report of Prof. Rogers.

The great Conglomerate, of which we have spoken as existing in Southern New-York, attains a thickness of more than 2500 feet in Pennsylvania on the Susquehanna. It contains no fossils, except fragments of plants.

It is succeeded by what is called, in the Pennsylvania Report, the Umbral Red shale, which in that State is about 3000 feet in its greatest thickness, though far less in some districts. It is in Pennsylvania almost entirely composed of soft red shales and

argillaceous red sandstones, seen in the northern counties, and generally around the edges of the different coal-fields (especially in the Sharp mountain south of Pottsville, where it has been so uplifted that its layers stand perpendicular in the walls of the valley); but when traced southward through Virginia, is there found to embrace near its middle several hundred feet of grey and brownish limestone, which also extends far to the west, and is known as the CARBONIFEROUS LIMESTONE. The St. Louis and Keokuk limestones of Missouri and Iowa are part of the western extension of these rocks. These limestones abound in fossils; but the formation in Pennsylvania (where it is all red shale and sandstone), contains scarcely a shell or other fragment of any living form. It, however, bears traces of life of a different nature; for there have been found on the surfaces of some of its layers, which doubtless once formed a beach left bare by the tide, tracks or footprints made by some fourfooted animal which had walked over them while yet soft. The animal which left these prints was in all probability a large lizard, or some similar reptile; and there are, between the right and left lines of the tracks, obscure furrows, as if made by its tail dragging on the soft mud or sand. These tracks are two or three inches in diameter, and show five toes upon each foot. The layers on which they are found often show little dots or pits scattered thickly over them, which appear to have been the marks of heavy raindrops falling on the slimy sand when fresh and soft; and in some instances they are intersected in all directions by small cracks, just such as are at this day formed on muddy shores by the drying action of sun and wind. These footprints are of the greatest interest; for they are the oldest vestiges to show the existence of any form of life higher in degree than fishes—and thus the oldest relics of air-breathing animals.

This "Umbral Red shale" is covered by another thick series of conglomerate strata, called by Prof. ROGERS the "SERAL CONGLOMERATE." It is a gray and whitish conglomerate, in massive beds alternating with gray sandstones. It is 1100 feet thick in the Sharp mountain south of Pottsville, and often contains one or more thin seams of coal; being the lowest position in which any considerable quantities of that mineral have yet been found.

This is the base of the "Productive Coal-measures," as the strata containing workable layers of coal are called. These are made up of thick beds of sandstones and black slate, with which

the coal layers are interstratified. These strata of coal are of all thicknesses, from a few inches up to twenty or even forty feet, and are separated from each other by masses of rock of from ten or twenty to two or three hundred feet thick, and they are mined in various ways according to their situation : in a few places, where they are covered by but little rock, being quarried in open daylight; in others, mined by galleries or tunnels driven into the hillsides on a level; in others, by deep pits.

Geological investigation in all coal countries has led to the conclusion that these strata of coal are vegetable matter, which during the Carboniferous epoch appears to have reached an enormous and luxuriant growth, and formed vast accumulations, which, after being buried under the marine sediments of sand and clay which now form the slates and sandstones over them, underwent the chemical changes which transformed them to their present condition. The proofs of this are found in the facts that the rocks above and below the coal seams are filled with vegetable remains, leaves, stems, roots, etc.; the trunks of the trees being in some places found still erect and standing upon their roots, but converted into coal; and that even the coal itself, though in most cases it is solidified into one mass so as to show no organic structure, displays in other instances, under the microscope, all the texture of wood, the cells, the ducts through which the sap once circulated, and even minute markings by which it can be determined whether the wood belonged to one or another general class of trees; for instance, whether it was a cone-bearing tree like the pine, or one of another family.

This vegetable origin of all the coal seems well-established; but the mode in which such great accumulations of it were made over such vast areas,* is yet an obscure question. The prevailing opinion is that it grew in enormous morasses or swampy tracts, resembling on a larger scale the Great Dismal swamp, or the Okefenoke swamp of Georgia; in which the annual fall of leaves, branches, and trunks at last formed thick peaty masses, which, being submerged under the sea and covered with sediments, became the vast piles of fossil fuel which are now of so great importance to our race.

* A single bed of coal, that called the Pittsburgh seam, is known to extend over no less than 14000 square miles, with a usual thickness of from four to ten feet. Other layers, though less in extent, are much greater in thickness, reaching even forty feet.

The fossils of the Coal measures are almost entirely vegetable. In the slates above the coal seams, most perfect and beautiful impressions of leaves occur in profusion; and large trunks or stems are found, almost always compressed to a thickness of only an inch or two, though two feet or more in width. The greater part of these trees seem to have been allied to the tree-ferns of tropical climates, though there are remains of cone-bearing trees and several other vegetable families. The character of this fossil vegetation would seem to indicate that at the time it grew, a far milder climate than that now known prevailed over the temperate and arctic zones; and the tropical forms of many fossils of the older rocks (such as the nautilus-like shells), confirm us in this opinion.

A small collection of the vegetable fossils of the Coal formations is displayed in a case at the end of the New-York Collections, next to that containing the Catskill and Conglomerate fossils. They are few, but serve to give the inexperienced observer a general idea of the character of these relics.

The belief that the coal is of vegetable origin, seems to explain why the lower rocks which form the State of New-York contain no coal. They appear to have been formed before terrestrial vegetation flourished to an extent sufficient to form accumulations of this substance. The first relics of land plants are found in the Hamilton group; above which they become more numerous, and in the Catskill group are quite abundant, forming occasionally miniature coal seams an inch thick. In the great Carboniferous formation, they increase suddenly to an enormous quantity, and in later formations are found in considerable, but generally in less abundance; and though coal is found in smaller quantities in newer rocks, such as the Jurassic and Tertiary, it seems never to have been formed in such profusion as in what is called the Carboniferous period.*

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* The Coal or Lignite beds of the central part of the continent near the Rocky mountains, appear to be of a much later date, and to belong to the Tertiary rocks. The same is true of the coal of Vancouver's island on the Pacific. The coal beds near Richmond, Virginia, are of an intermediate age. The conclusions to be drawn from our present knowledge are, that good coal may be *sometimes found above* the Great Carboniferous system, but *never below it*.

We have thus traced the great series of stratified rocks from their Hypogene Granite foundation up through the Carboniferous. But this—though forming all that is distinctly shown in and near New-York—is only the earliest and oldest portion of the geological formations which are known, and embraces, in a historical view, only the development on earth of the lower and older forms of animal life. We may be permitted very briefly and rapidly to glance at the succession of the newer formations and the character of their fossil relics, as shown by explorations in other regions. Of all these formations and fossils, it is intended to show hereafter some small collections in this State Museum; which may thus not only afford the student a very full and complete exhibition of our own Palæozoic rocks and fossils, but a general representation of those of that later part of the whole grand series, which, beginning at the era of the Coal, reaches to the period of man's existence and civilization.

Though these formations exist in many parts of the world, the best connected series of them is that of England. There, as here, are found the hypogene or granite rocks, succeeded by gneiss and other metamorphic strata; and these are followed by vast piles of rocks similar in general texture to, and closely corresponding in fossils with, the rocks of New-York. The lower part are there called Silurian; the upper, Devonian: the former corresponding, as far as we can judge, with our strata below the Oriskany sandstone; the latter, with those between it and the Carboniferous.* Shells, trilobites, and remains of fishes are found in those rocks, of forms sometimes identical with those of New-York, sometimes only having a general resemblance; but these strata are there so broken, upheaved, and distorted, and

* The Devonian includes the Old Red sandstone, made so famous by the attractive geological writings of Hugh Miller; and the American counterparts of its strata are probably to be found from the Hamilton group to the Catskill group. They contain similar fish-remains; but in their other fossils, differ very materially from the Old Red sandstone of Scotland.

are comparatively so poor in fossils, that they are as a series far less perfect and instructive than those of this State.

These Silurian and Devonian strata are there, as here, succeeded by a Carboniferous formation, with its beds of coal and abundant vegetable remains, but far less in breadth of extent than the enormous coalfields of America. But above the Carboniferous, they have the newer formations, which succeed each other from west to east, as our older ones do from north to south. This is because the dip or downward slope of the strata is there to the east or southeast, not as here, to the south. The section at the beginning of this pamphlet (No. 2) gives a general idea of their succession across England from Derbyshire to Sussex, though it is far from accurate in either proportion or smaller details.

First above the Carboniferous, lies what is called the PERMIAN SYSTEM: several hundred feet of limestone, marls, slates and sandstones; containing many fossils, shells, corals, fishes, and the bones of several kinds of reptiles.

Next lies the TRIASSIC SYSTEM, or NEW RED SANDSTONE, which contains the great mines and springs from which most of the salt used in and exported from England is manufactured. It is a thousand or two feet thick; and though generally not abounding in fossils, some very remarkable forms of reptiles have been discovered in it, and many fish.

It is believed that the Red sandstone of the Connecticut valley, which is also found crossing New-Jersey, Pennsylvania and Virginia, is of the same age with the Triassic system of Europe. This opinion is mainly founded on the similar character of the fossil fish in the two formations. It will be remembered that it is in this rock that the footprints of birds mentioned on page 53 occur. Specimens of these are in one of the rooms, and are of great interest, for they mark, so far as is yet known, the period when the great class of BIRDS first appeared on earth. (They bear also other tracks, considered as being those of various kinds of reptiles.) Specimens of the fish of this formation, from the Connecticut valley and New-Jersey, are in a case in one of the rooms of the collection.

Next above the Triassic system, succeeds what is called (from constituting the greater part of the Jura mountains in Switzerland) the JURASSIC SYSTEM. The whole formation is several thousand feet in thickness: its lower part, known as the LIAS, is several hundred feet of dark marly shales and straight thin

layers of black limestone; the upper part, often called the OOLITE, is generally yellowish or drab limestones and shales. The Lias abounds in shells of numerous genera : among the most abundant are the AMMONITES, or nautilus-like chambered shells with curiously plicated partitions. Of these, there are in the Lias and Oolite, and the Chalk which overlies them, more than a thousand species, many of them very beautiful and graceful in form, and varying in size from that of a dime to four feet diameter. Many kinds of fishes are found in the LIAS, some of them so well preserved that hardly a scale is out of place; but instead of the strange heavily-plated fish of the Devonian system, they approach in form more nearly to existing fishes. There are fossil plants, all differing from those of the Coal formation. The most remarkable of the remains in the Lias, however, are those of reptiles; many of which are larger than any now known, and of very strange forms, seeming to blend the characters of reptiles with those of fishes; and there is one very remarkable family of small reptiles (the PTERODACTYLES), which had bat-like *wings*, seeming to realize the fables of flying dragons.

The Oolites, or upper Jurassic strata, contain many beautiful ECHINI, or Sea-eggs and reptiles, fish and shells in great numbers; but the most important relics found in them are those of the earliest known MAMMALIA.* These seem to have been small quadrupeds allied to the OPOSSUM, and belonging to the lowest orders of the Mammalia; but they mark, so far as is yet known, the first appearance of any terrestrial or warmblooded animals except birds. Remains of Insects are also found in some Jurassic layers, the fine texture of which (in the Lithographic limestone of Bavaria) admitted of the perfect preservation of such fragile things.

The Jurassic is succeeded by the CRETACEOUS SYSTEM, of which the WHITE CHALK forms in England and France a considerable portion, being several hundred feet thick where seen in the seaside precipices of Beachy Head and Dover. The whole system abounds in fossils, consisting of fish, reptiles, shells of many families, echini, crinoids, etc. etc. One of the most remarkable evidences of the quantity of the smallest forms of life which have existed, is found in the fact that a great part of this enor-

* Mammalia are animals which nurse their young; a great class, comprehending all the more highly organized animals.

mous bed of White chalk is made up of the skeletons or shells of minute living things ordinarily spoken of as animalcules, so small that they are not to be detected without the aid of the microscope. The oldest now living forms of earth belong to these tiny beings, for it is believed that some of those found fossil in the Chalk are identical with some which live in the ocean to-day. Every shell, every fish or other relic found in the Cretaceous strata, is of an extinct species; of many, no analogous or closely similar form now exists, but these minute organisms still survive without change.

The lower beds of rock which overlie the Cretaceous system, called the TERTIARY FORMATIONS, exhibit in their fossils a close resemblance to now-existing forms, and some of them are the same. As we examine the fossils of higher and higher strata of the Tertiary, we find the proportion of extinct species gradually diminishing, and that of still extant species increasing, until in the Upper Tertiary they show a set of animal inhabitants and plants almost precisely the same with those which now exist; the same trees, the same quadrupeds, the same shells buried in the newest tertiary strata being still found living. Thus, through the enormous succession of strata which we have traced, we have found a gradual advance in their fossil relics: the first shells beginning in the Lower Silurian, or Potsdam sandstone; the first fishes, in the Lower Devonian, or Oriskany sandstone; the first land-plants, in the Middle Devonian, or Hamilton group; the first reptiles, in the Carboniferous; the first birds, in the Triassic, or New Red sandstone; the first warm-blooded quadrupeds, in the Jurassic; while the more modern mammalia, the ox, horse, deer, the canine and feline tribes and others now abundant, as well as the modern trees, such as oaks, beeches, maples, palms, etc., first appear in the Tertiary.

The remains of MAN and his works are found only in the newest of all the Tertiary beds, which appear to have an age of not many thousand years. Man thus appears to be the latest introduced on earth of all its living tenants, or at least to have appeared only among the latest creations. The earliest relics of him appear to be some rude knives and arrow-heads of flint,—such as are universal among savage hunter-tribes;—which have been found in association with bones of extinct animals, buried in gravel beds in France and England. There is yet some doubt and uncertainty hanging about these evidences of human anti-

quity; and it is possible that they are not as old as the animal relics with which they occur.

A few fossils from the Lower or Older Tertiary strata around Paris in France, are in a case on the second floor. They are chiefly shells, and all or nearly all, of extinct species, though strongly resembling those now found in the seas of mild or warm climates.

Of the various formations newer than the Carboniferous which we have passed in review, many are represented in different parts of North America, but not in so unbroken a succession as in Europe. Thus the PERMIAN formation is believed to exist in Kansas: the Connecticut sandstone, so largely quarried for the New-York market, is regarded as having been formed during the same period with the European TRIASSIC or LOWER JURASSIC strata; marls and clays of CRETACEOUS age, and containing many fossils similar to those of the European CHALK lie all along the Atlantic coast from New-Jersey to the Gulf of Mexico; and TERTIARY strata are found in all the Southern States. A very remarkable series of Tertiary strata exists also near the Upper Missouri, on White river, called the "Mauvais Terres" or "Bad Lands," from which many remarkable fossils were recently collected for the Smithsonian Institution. They consist of skulls and bones of several extinct quadrupeds, some carnivorous; others herbivorous, some of them of aquatic habits; and shells of fossil turtles. These "Mauvais Terre" strata appear to be of freshwater formation.

The natural monuments of geology since the Tertiary period are few: the most remarkable being the enormous accumulations of gravel, sand and clay which are found so widely spread, and which are known as the

DRIFT.

This is well seen in almost all parts of this State, in almost every gravel-bank: it consists of waterworn fragments of the old rocky strata; pebbles of limestone, sandstone and slate, with some of gneiss and granite, which universally appear to have been trans-

ported from north to south. From a bushel of pebbles taken from any gravelbank south of the Erie Canal, the geologist can pick out specimens of almost every stratum which is exposed north of the bed whence they were taken. South of the line of outcrop of the Helderberg limestones, the gravel banks are full of fragments of their different layers; and among them lie worn pieces of the red Medina sandstone, others of the Hudson-river group, and others of still more northern strata; while some are granite pebbles, which must in many instances have come from Canada. They have evidently been transported from north to south in vast quantities: they are smooth-worn, and are smaller the farther they are found from their original strata; they are generally found in irregular layers with sand and clay, as if left so by the action of rapid currents of water. One of the most puzzling facts connected with them is, that they have been in many cases transported from lower to higher levels, even up steep declivities and over high hills.

There are spread with them also (but generally lying on the surface of the ground) many large and heavy masses of loose rock, called boulders. Some of these are limestones or sandstones, the origin of which can easily be traced to thin native strata within the State; others are granitic masses, which must have come from beyond Lake Ontario, in the same manner that the peculiar granitic rocks of the Adirondack mountains are found to have been carried south beyond the Mohawk valley. And the surfaces of the rocky strata in all the country over which these "drift beds" have passed, are in many places found to be worn smooth, and scratched or furrowed in a general north and south, or northwest and southeast direction, as if such heavy materials had been dragged or driven over them.

Some geologists refer these facts to the operation of glaciers moving from the north over the country, during some supposed epoch of arctic cold; others think the scratches were made by stones pushed over the bottom by grounding icebergs floating from the north, while the country was submerged; others believe the gravel and boulders were transported, and the rocks smoothed and worn, by violent currents which were thrown over the land from the north by some convulsion, such as the uplifting of a great tract of northern sea-bottom, which might have poured its waters towards the south in great depth and with enormous force. It must be admitted that none of these theories fully

meet the difficulties of the case, and that the facts of the Drift form one of the most obscure and perplexing questions in all geological investigation.

Above the gravel beds, near the St. Lawrence and Lake Champlain, are some beds of clay, two hundred feet thick or more, which contain marine shells of species now existing on the coast of New-England and Canada. These prove that since such shells were living, those valleys must have been depressed below the sea-level, long enough for these deposits of clay to be formed. They are known as the PLEISTOCENE* clays. (The Albany clays are their southern extension, but contain no fossils.) Specimens of the shells of this *Pleistocene* are in case.

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* PLEISTOCENE, from two Greek words signifying "the most recent," because they are the newest of all marine deposits known in the State.

We may add in conclusion a few remarks on the causes which have brought the rocky strata of New-York from the original level and unbroken condition in which they were formed, to the waving and broken surface of hills and valleys which we now see. It is probable, as we have before stated, that during the slow process of their emergence above their native sea, the action of waves and currents wore them deeply and extensively; and since they were fairly uplifted to their present elevation, the elements have been unremittingly acting upon them until now.

We know that, in all probability, no rocks newer than the Carboniferous were ever deposited within the area of our State. It seems therefore, that this region has been above water since the Carboniferous period; during all the countless ages while the Permian, Triassic, Jurassic, Cretaceous and Tertiary formations were formed; during the deposition of which the animated population of earth has been changed many times. All of these must have been made of sediments worn from pre-existing dry land. We should expect, therefore, that this ancient land would show the marks of vast erosion or wear. Such marks are found in the long and deep river-valleys which cross the State, all of which have evidently been worn out of the solid strata, the remaining portions of which form their bounding hills. They are still being worn deeper and wider by rains and streams; but how far the action of these, continued through an indefinite though vast period of past time, may be deemed adequate to produce such enormous excavations, may be questioned. And there are some valleys which have been excavated much below the level of their outlets, so that they retain the waters and form the remarkable series of lakes of which we have before spoken. Such instances seem to require a different explanation, which it is not easy to give.

However inexplicable it may be, with our present knowledge, the fact is plain that not only these valleys have been worn out, but hundreds of feet of rocky strata have been removed from the

summits of the hills themselves, and from large tracts of plain country. The whole vast basin of Lake Ontario is an excavation in rocks, which still lie nearly as level as when first deposited; and there seems no reason to doubt that the northern edges of the enormous piles of slate rocks above the Helderberg limestones once overspread what are now the level plains of the countries bordering on that inland sea.

Such long lines of bluffs as the Niagara "mountain ridge," or the steep escarpments of the Helderberg limestones, seem to indicate the action at some period of waves from a broad expanse of sea, to which they stood as coast-precipices. The existence of old beaches, such as the Lake Ridge near Rochester, seems to prove that the waters of the lakes once stood far higher than now: perhaps the land may have stood much lower, and they were inland bays or gulfs of the ocean.

This whole subject is obscure, and we have mentioned it only from a desire to embrace in this sketch a glance at every point of interest connected with the surface of the State, as well as with the strata of which it is built up; and to direct wider and more general study and observation to the Natural Monuments of the Past.

Among the most recent of geological monuments, which seem to link together the vanished forms of the past with the conditions of the present, are the bones of the MASTODON and FOSSIL ELEPHANT, which are occasionally disinterred in various parts of the State, found buried only in recent accumulations of muck, peat, or other earthy materials. They appear to be relics of a very modern period of geological history, and their owners seem to have lived since the existence in this region of many of our still-remaining wild animals; possibly even since it was inhabited by man. Specimens of these are in the Collection; and there is also a plaster cast of the skull of the *Castoroides ohioensis*, a gigantic extinct species of beaver, which was probably of the same period with the mastodon. It was found near the village of Clyde, in earth, during the excavation of a canal.

The petrified wood, leaves, moss, etc., which are so common in our limestone districts, are of modern date, and are being formed at the present time. The rainwater which percolates through

the crevices of the limestone rocks, by the carbonic acid which it contains, dissolves the lime; and on coming again to the light and air in springs, re-deposits it in the form of tufa, a drab-colored mass which is nearly pure lime. This, as it gradually forms, incrusts the leaves, sticks, etc., with which it comes in contact; and often, as they decay, replaces them in such a manner as to present the same form and structure; pieces of wood being thus replaced or substituted by a stony mass closely resembling the original substance.

NOTE.

The Curator of the State Collection will gladly receive for it specimens of rare, or especially of new fossils.

The attention of collectors is especially directed to the remains of Crinoids, Star-fishes and Echini, which exist through nearly the whole series of rocks of New-York, but are hitherto very rare; and any distinct relics of Fossil Fishes, such as scales, plates, bones or teeth, will be very welcome. Good specimens of the Trilobites and other Crustaceans are also desired, and shells of the larger and rarer forms.

The more perfect specimens of such relics come under the eyes of observing persons only occasionally, when favorable opportunities, such as excavations or quarrying operations, offer; and cannot be collected at once by any amount of labor or exploration. To make the State Geological Museum as complete and useful as possible, the Regents rely confidently on contributions from students and friends of natural science, to whose aid they already owe much of the most valuable part of the collection.

It should be remembered that the useful value of any such specimen depends almost entirely on accurate knowledge of its locality; that is, the particular formation, and, if possible, the stratum from which it came; for, as has been before shown, it is on the presence of certain fossil remains *in certain formations* that the whole historical conclusions of Geology are founded. Care should always be taken that the correct origin of every fossil from its rock be accurately known, and that it be not attributed to any other position than its true one; otherwise it becomes a *cause of error*, instead of evidence of truth.

CORRIGENDA.

In arranging the woodcuts of fossils, it has been found necessary to affix to them different numbers from those by which they were originally denoted, and by which they have been referred to in Appendix B. The reader will, therefore, to avoid confusion, *disregard entirely* the references by numbers scattered through the pages of such appendix, and find the illustrations by the lists printed opposite the engravings.

In regard to the newly discovered fossils mentioned on p. 50 as indicating the existence of fossiliferous strata older than the Potsdam sandstone (such as has been supposed to exist in the controverted "Taconic System"), a probable opinion seems to be that these fossil-bearing strata are not really of such a lower series; neither of the Hudson-river group; but that they belong to an intermediate position, and are equivalent in age to the Calciferous sandstone and Chazy limestone. These rocks may, in the Green Mountain chain, be much more largely developed than in New-York, and may contain many more fossils, while their disturbed condition in the upheaved hill-ranges renders it extremely difficult to trace out their true age and relations.

On p. 61, for *Meganteris ovoides*, read *Meganteris elongata*.

Fossils of the Potsdam sandstone.

1. LINGULA ANTIQUA (page 36).

Fossils of the Chazy limestone.

2. RAPHISTOMA STAMINEA, upper surface and profile.
3. ASAPHUS (the caudal portion of the animal).
4. BUCANIA SULCATINA, profile outline.
5. — — front view.
6. SCALITES ANGULATUS (p. 40).
*7. COLUMNARIA ALVEOLATA (of the Black-river limestone).
8. RAPHISTOMA STRIATA.
9. ORTHIS.
10. DISCINA DEFORMIS.
11. MACLUREA MAGNA, upper surface (p. 30).

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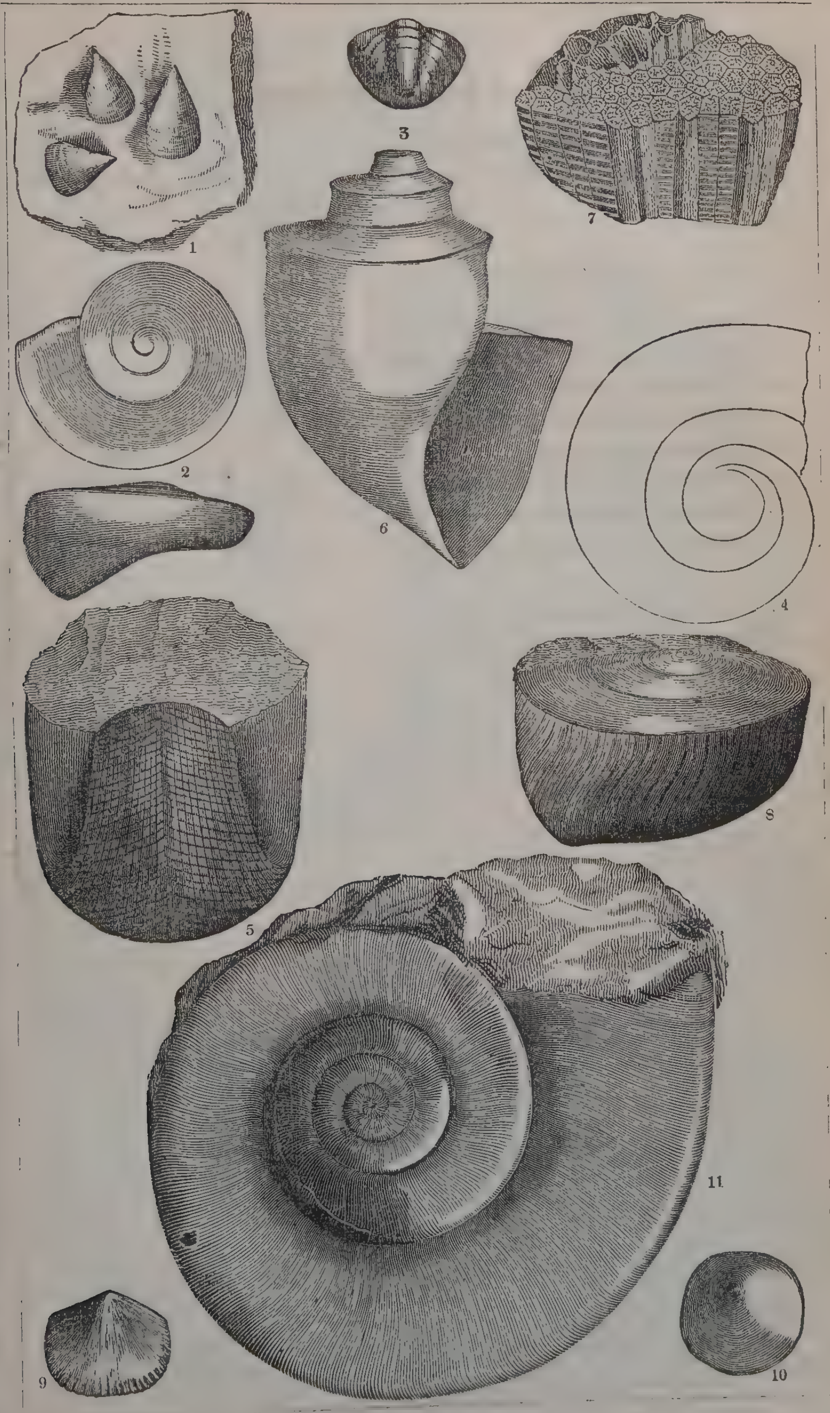
* This "COLUMNARIA" is one of the Corals which grow in crowded masses, like the cells of honeycomb. It is sometimes found in masses of a ton or more in weight.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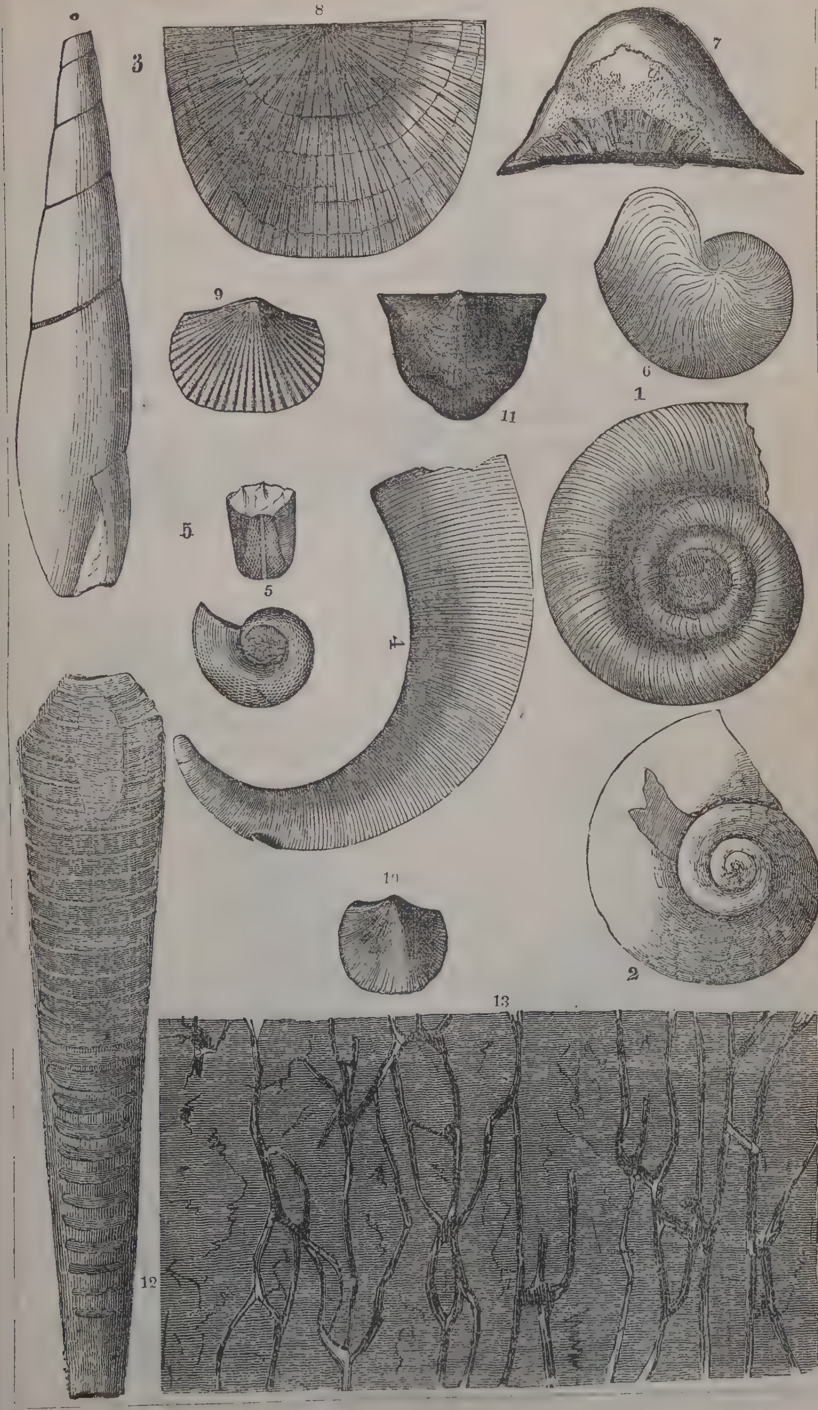
Fossils of the Birdseye limestone.

12. ORTHOCERAS MULTICAMERATUM (p. 41).
13. PHYTOPSIS TUBULOSUM (as seen in the broken edge of the strata). This is the plant described on page 41.

Fossils of the Trenton limestone.

1. TROCHOLITES AMMONIUS (p. 47).
2. PLEUROTOMARIA LENTICULARIS (p. 47).
3. SUBULITES ELONGATA.
4. CYRTOCERAS (a curved form of ORTHOCERAS).
5. BUCANIA PUNCTATA.
6. BELLEROPHON BILOBATUS (p. 47).
7. CHÆTETES LYCOPERDON (p. 48).
8. STROPHOMENA ALTERNATA.
9. ORTHIS PECTINELLA.
10. O. TESTUDINARIA.
11. STROPHOMENA DELTOIDEA.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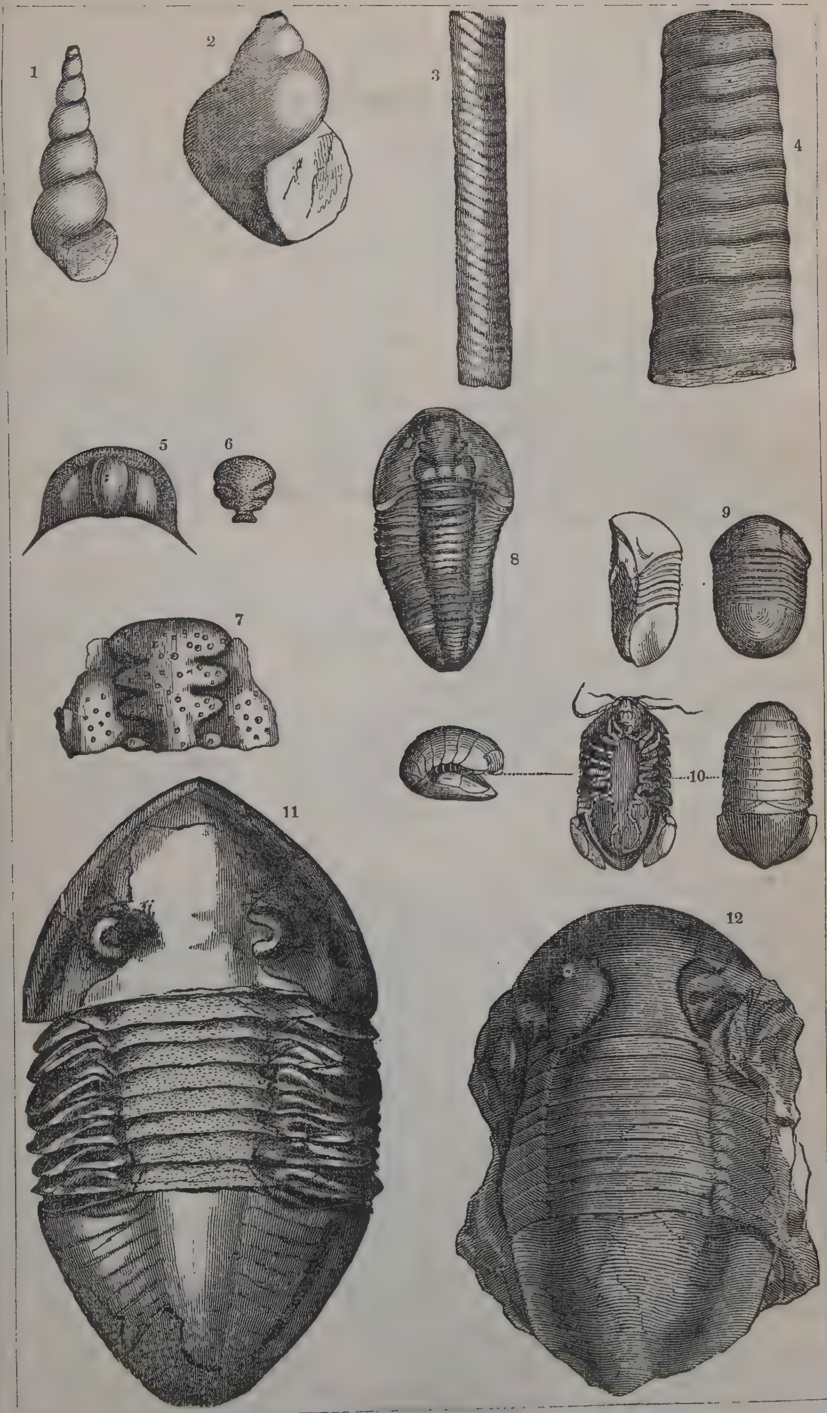
Fossils of the Trenton limestone.

TRILOBITES.

1. MURCHISONIA GRACILIS.
2. HOLOPEA PALUDINÆFORMIS.
3. CAMEROCERAS TRENTONENSE (ORTHOCERAS ARCUOLIRATUM).
4. ORTHOCERAS VERTEBRALE.
5. TRINUCLEUS CONCENTRICUS, detached head (p. 47).
6. DALMANIA, detached central part of head.
7. CERAURUS PLEUREXANTHEMUS, detached head; "cheeks" gone.
8. CALYMENE SENARIA, entire, but distorted.
9. ILLÆNUS CRASSICAUDA.
10. SPHÆROMA BUMASTIFORMIS: a living crustacean from the South seas, somewhat resembling the trilobites.
11. ISOTELUS GIGAS, or ASAPHUS PLATYCEPHALUS, perfect.
12. ILLÆNUS TRENTONENSIS, perfect.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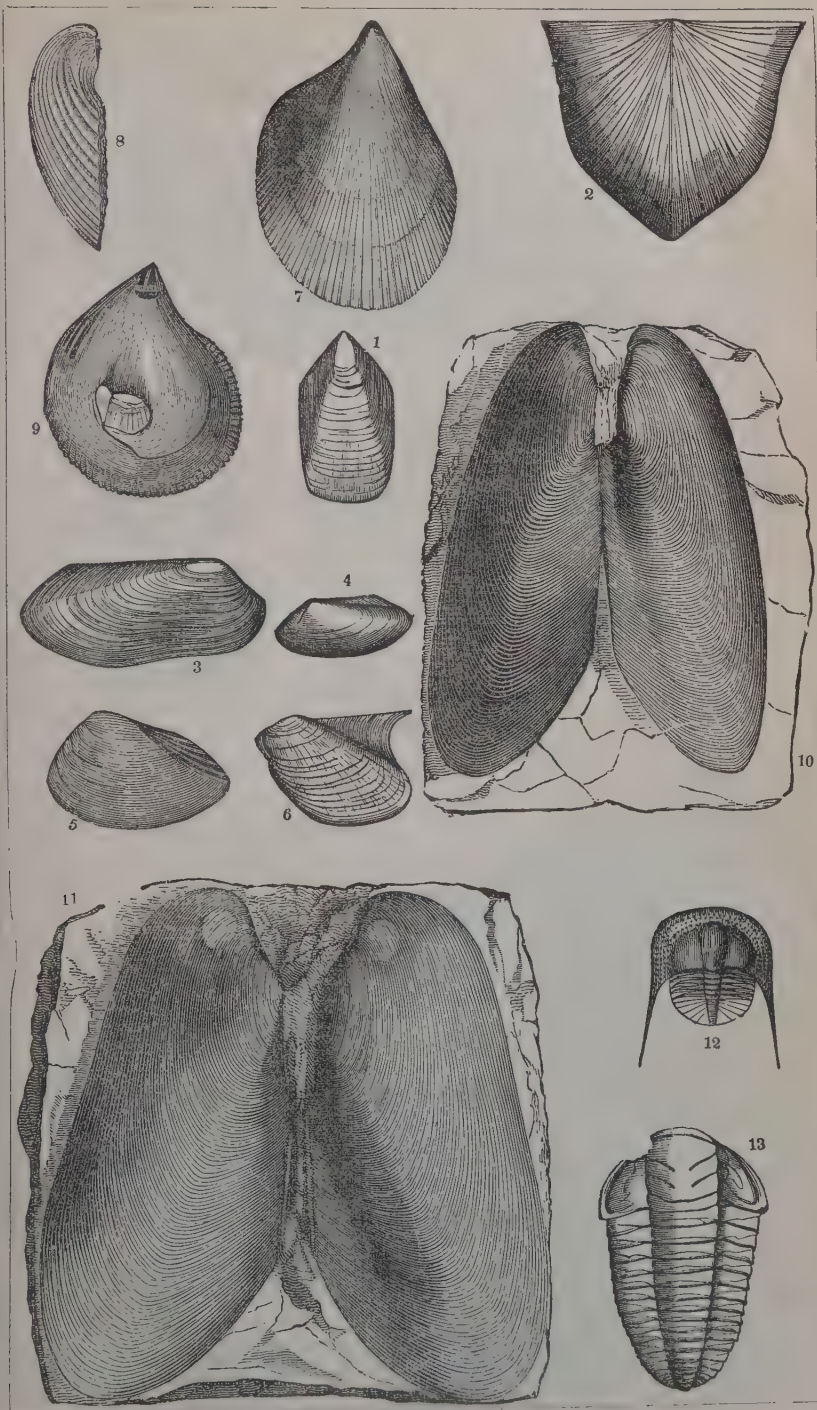
Fossils of the Hudson-river group.

1. LINGULA QUADRATA.
2. STROPHOMENA ALTERNATA.
3. MODIOLOPSIS ANODONTOIDES.
4. NUCULA.
5. NUCULA POSTSTRIATA.
6. AVICULA INSUETA.
7. AMBONYCHIA RADIATA.
8. Same, profile view.
9. Cast of the same.
10. MODIOLOPSIS MODIOLARIS.
11. Same.
12. TRINUCLEUS CONCENTRICUS, perfect specimen.
13. TAIARTHRUS BECKII (p. 49).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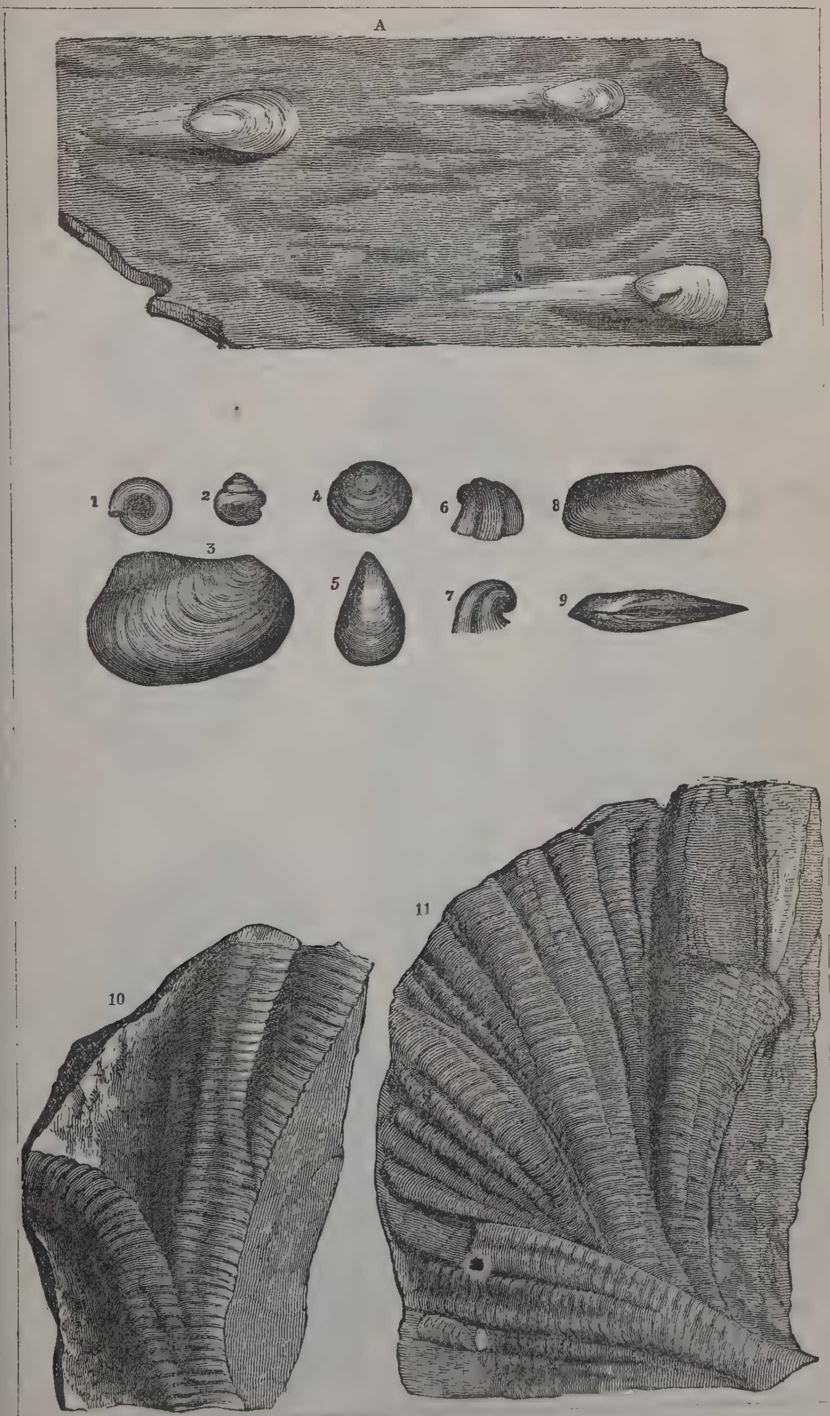
Fossils of the Medina sandstone.

A. Lingula cuneata : Three specimens, as found on the surface of a layer. Ripplemarks are visible on the rock ; and a little ridge of hardened sand extends from each shell, doubtless formed by the tide-current when the shells lay on the sandy sea-bottom, now hardened to rock (See Hall's Report, 3d Dist., p. 52).

1. Pleurotomaria parvetusta, base.
2. Same, side view.
3. Modiolopsis primigenius.
4. Discina parmulata.
5. Lingula cuneata.
6. Bucania trilobatus, back.
7. Same, profile.
8. Modiolopsis orthonota, side.
9. Same, back.

10 & 11. Arthrophycus harlani (p. 52).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Fossils of the Clinton group.

1. ORTHIS CIRCULUS, side and end views.
2. ATRYPA CONGESTA, side and front views.
3. A. NAVIFORMIS, do. do.
4. A. PLICATULA.
5. Joint of crinoidal stem, natural size and magnified.
7. PENTAMERUS OBLONGUS, young shell (p. 53).
8. Same, old shell.
9. Same, profile view.
10. Same, internal cast* of lower valve.
11. Same, do. do. of upper valve.

    The dark cavities in the last two figures show where the peculiar internal plates of the shell were placed.

12. STROPHOMENA RUGOSA.
13. FUCOIDES BILOBA.

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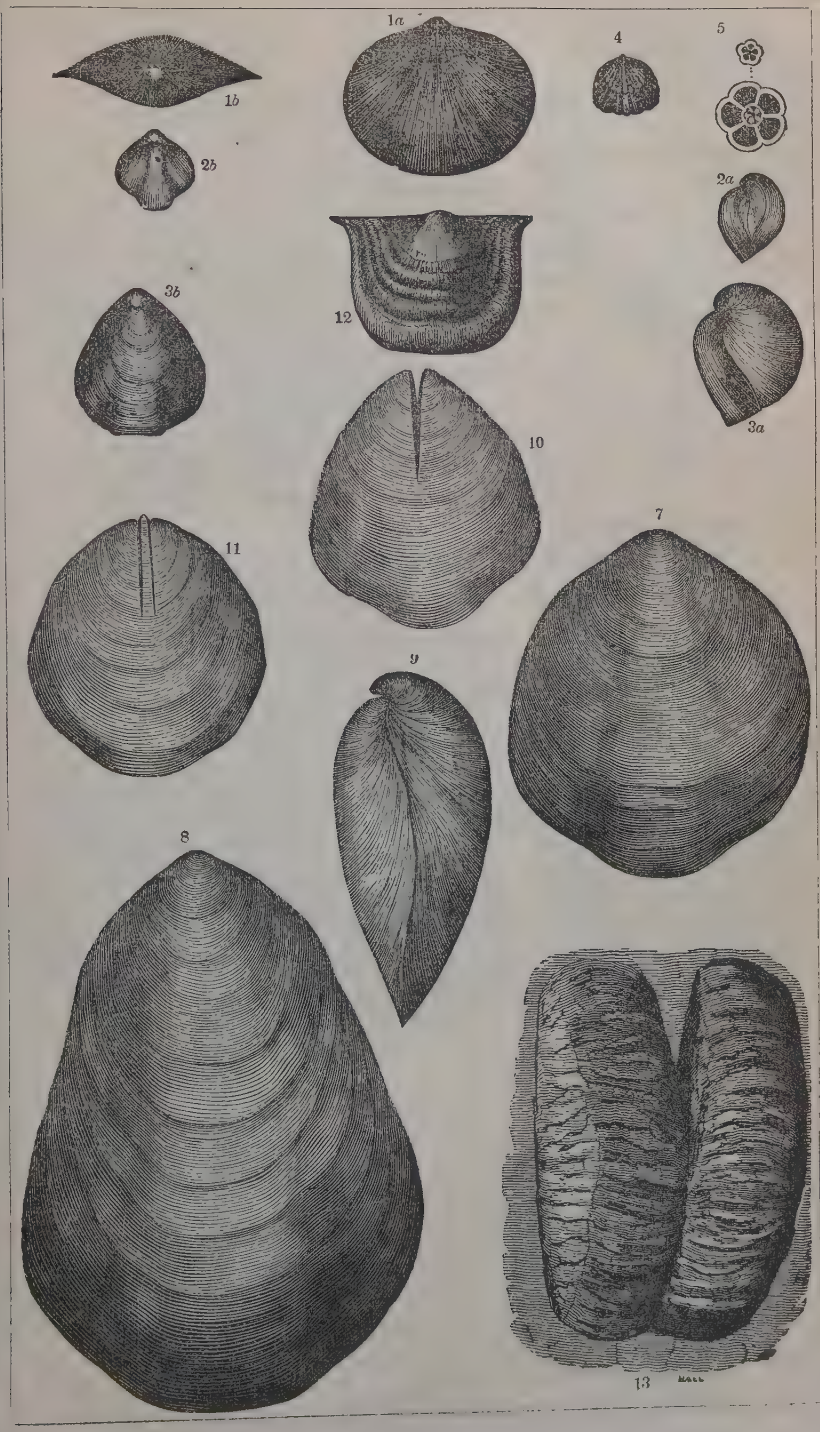
* For explanation of a "cast", see p. 27.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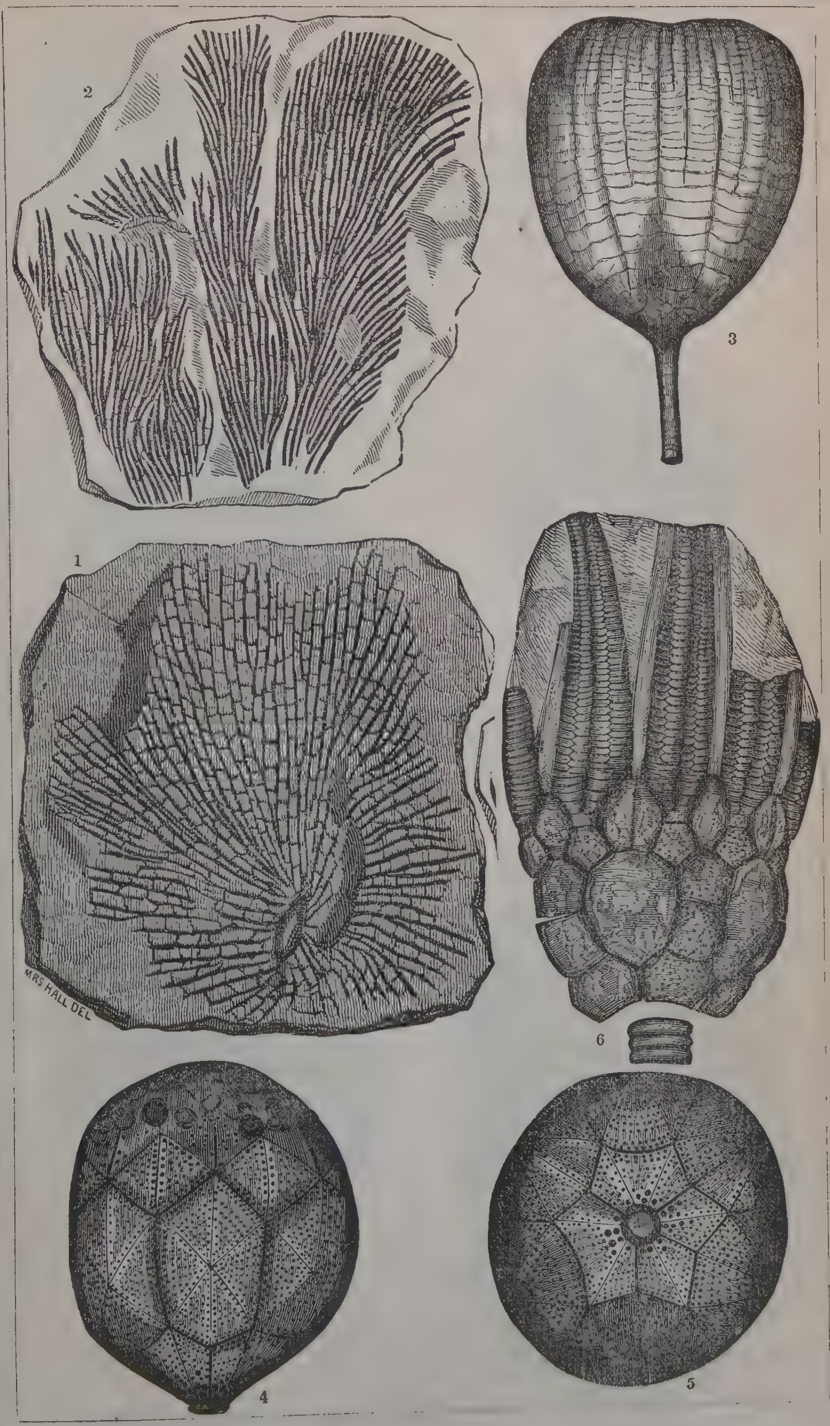
Fossils of the Niagara group.

1. Coral : Dictyonema retiformis (p. 55).
2. Do. : D. gracilis.
3. Crinoid : Ichthyocrinus lævis.
4. Do. : Caryocrinus ornatus, side (arms gone).
5. Do. : Same, base.
6. Do. : Eucalyptocrinus decorus (entire specimen; arms folded or closed).

For Crinoids, see pp. 45, 47.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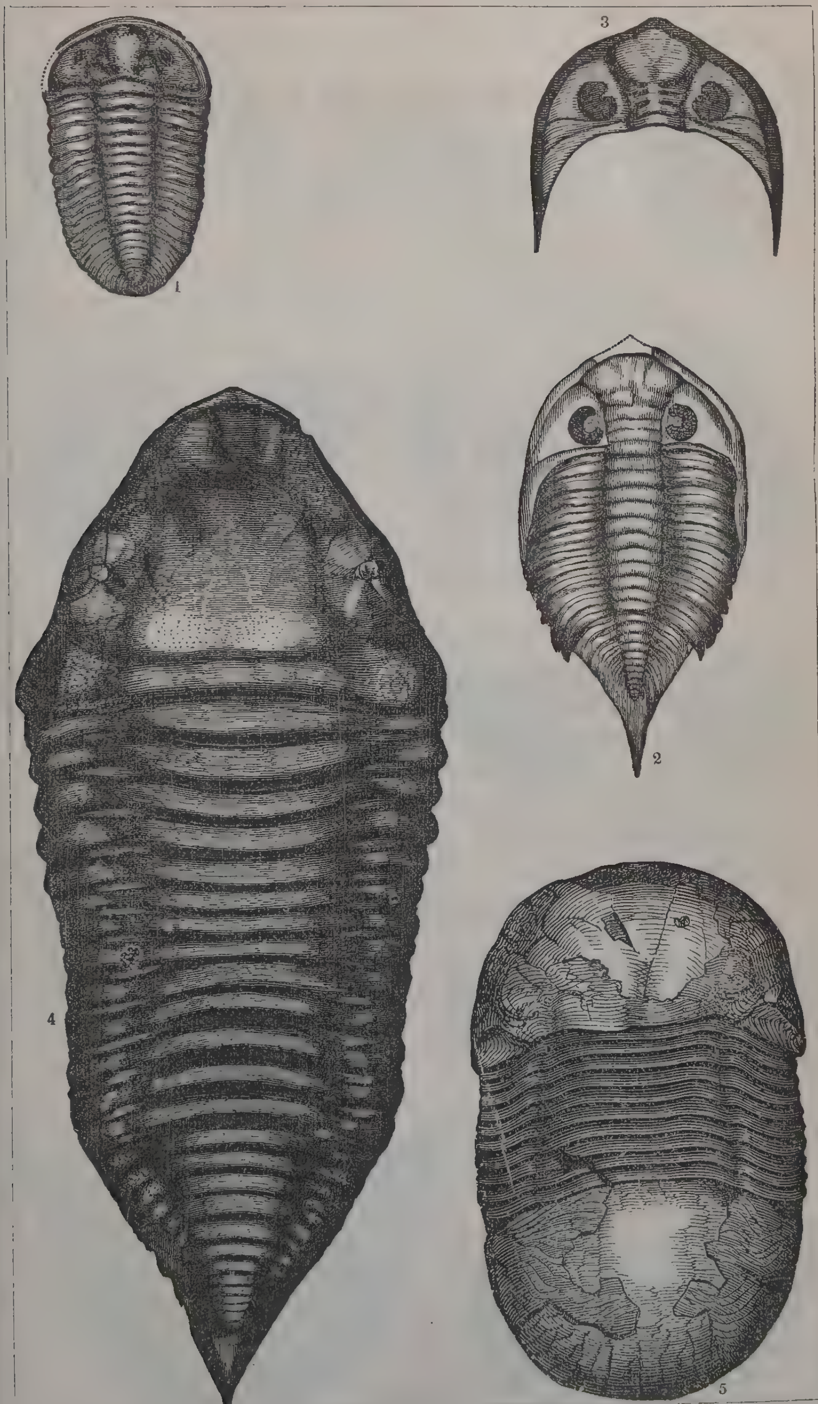
Trilobites of the Niagara group.

1. CALYMENE BLUMENBACHII [or SENARIA?] (p. 55).
2. DALMANIA LIMULURUS.
3. Same, detached head only.
4. HOMALONOTUS DELPHINOCEPHALUS.
5. ILLÆNUS BARRIENSIS.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Fossils of the Lower Helderberg group.*

A. *From the Waterlime series* (p. 58).

1. SPIRIFER PLICATUS.
2. AVICULA RUGOSA.
3. TENTACULITES ORNATUS.
4. LITTORINA ANTIQUA.
5. ATRYPA SULCATA.
6. CYTHERINA ALTA.

B. *From the Pentamerus limestone* (p. 58).

7. PENTAMERUS GALEATUS.
8. Same, front view.
9. EUOMPHALUS PROFUNDUS.
10. ATRYPA LACUNOSA.
11. LEPOCRINITES GEBHARDI.

C. *From the Catskill shaly limestone* (p. 58).

12. ATRYPA SINGULARIS, side and rear views.
13. EATONIA MEDIALIS.
14. SPIRIFER MACROPLEURA.
15. MERISTELLA LÆVIS, front and side views.
16. STROPHOMENA PUNCTULIFERA.
17. STROPHOMENA RADIATA.

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* This group is made up of the three limestones above specified.


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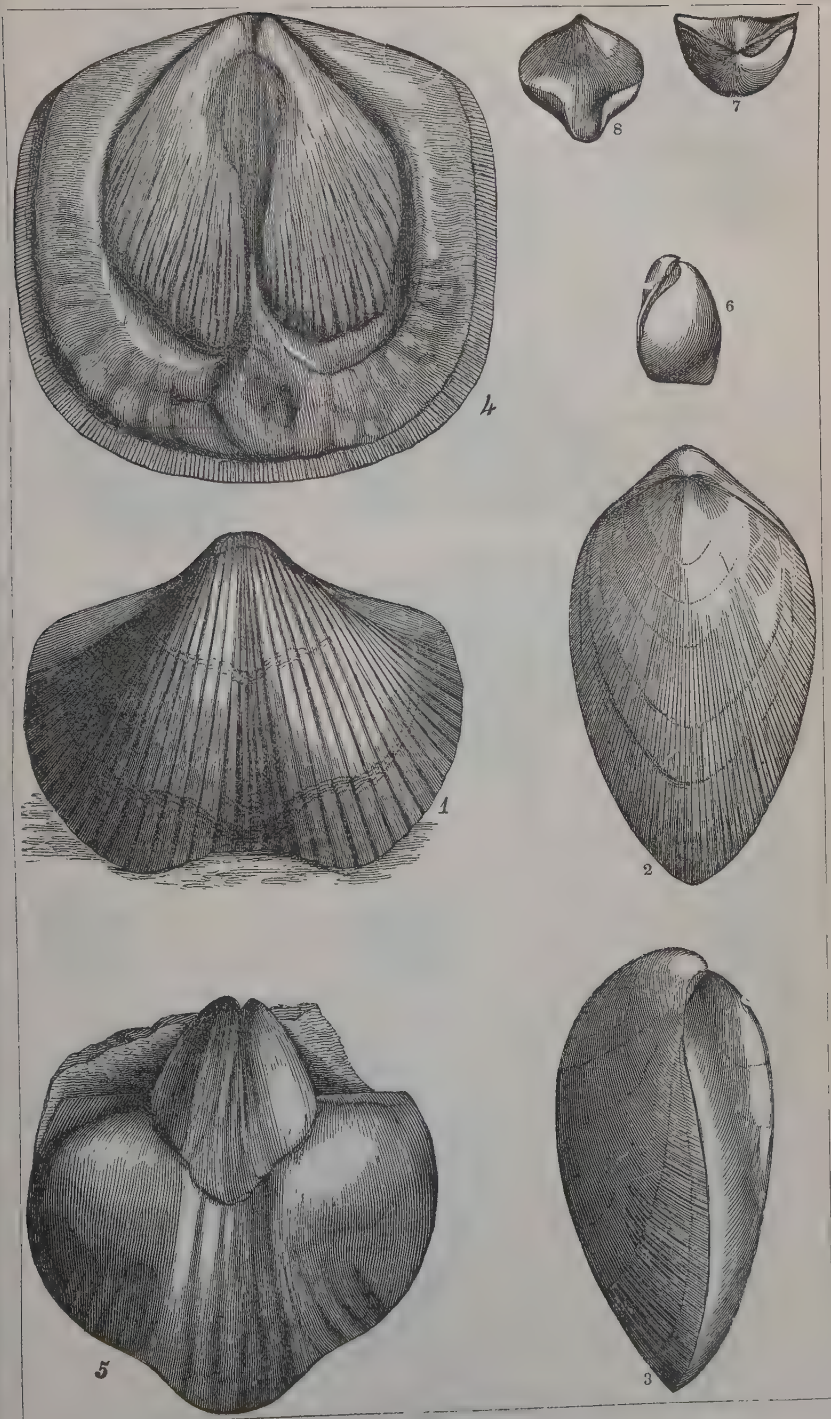
Fossils of the Oriskany sandstone (p. 59).

1. SPIRIFER ARENOSA.
2. RENSSELÆRIA OVOIDES.
3. Same, profile view.
4. ORTHIS HIPPARIONYX, internal cast of upper valve.
5. SPIRIFER ARENOSA, do do of lower valve.
6. EATONIA PECULIARIS, side.
7. Same, hinge.
8. Same, front.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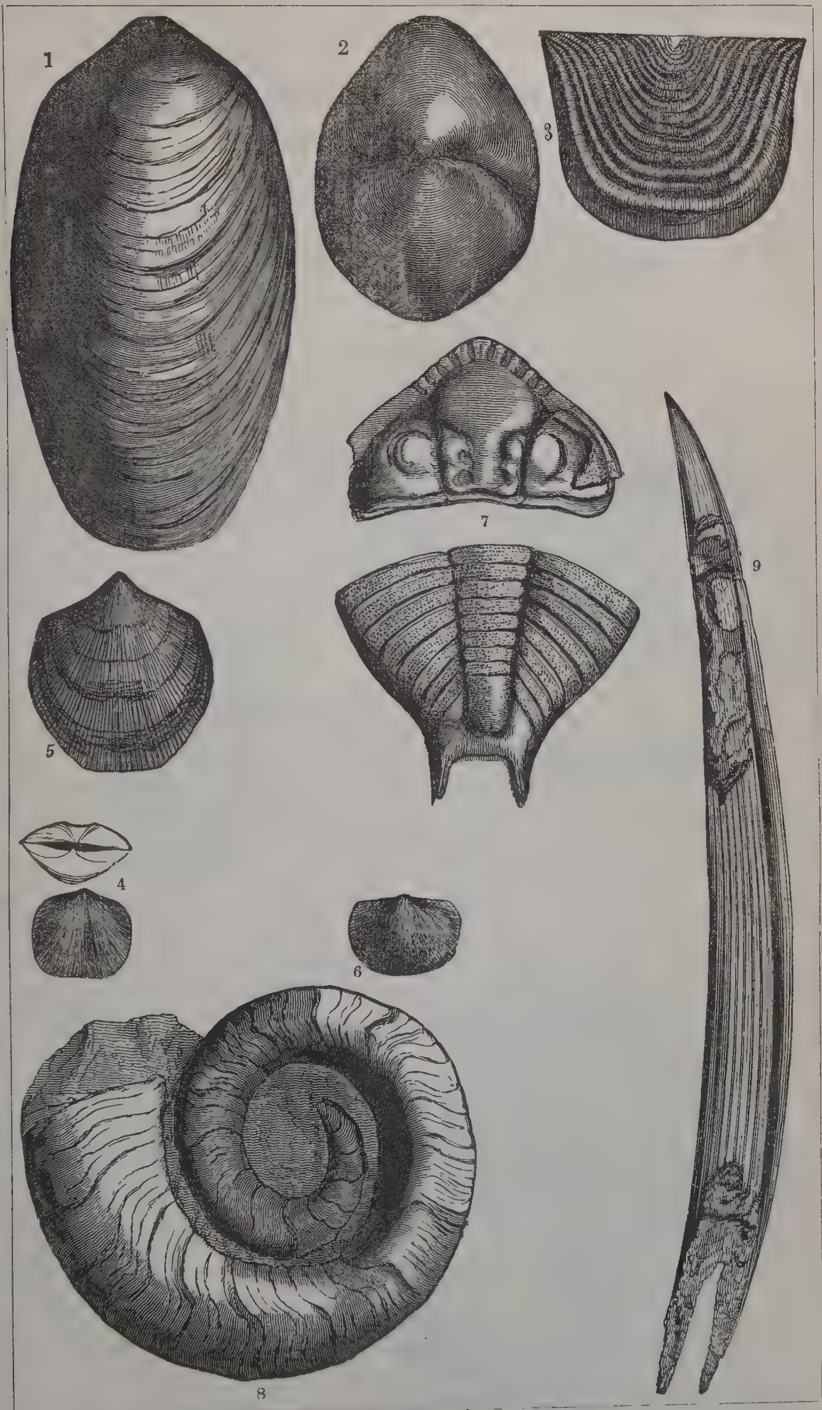
Fossils of the Upper Helderberg group.

1. Rensselæria (Meganteris) elongatus (wrongly called *M. ovoides* on p. 61).
2. Same, end view.
3. Strophomena undulata.
4. Orthis lenticularis, lower vàlve and front outline.
5. Atrypa reticularis.
6. Strophomena lineata, enlarged.
7. Dalmania selenurus : separate fragments, head and tail.
8. Cyrtoceras undulatus.
9. Ichthyodorulite, a defensive fin-bone of a devonian fish.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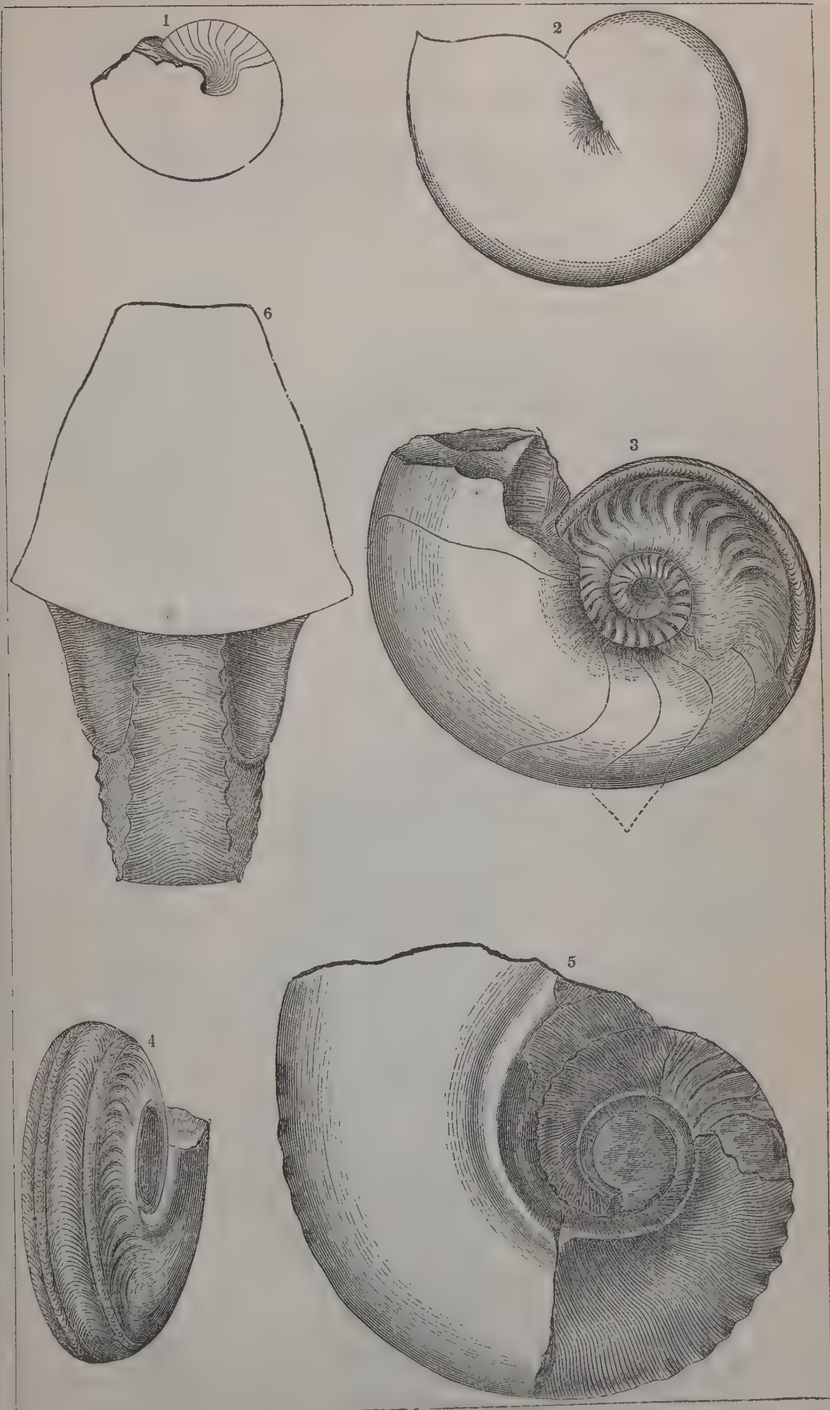
Fossils of the limestone layers in the Marcellus shale.

1. Goniatites discoideus, showing the septa.
2. The same, showing the exterior form.
3. Goniatites expansus.
4. Same, back view (p. 63).
5. Nautilus ornatus.
6. Same, back view (p. 64).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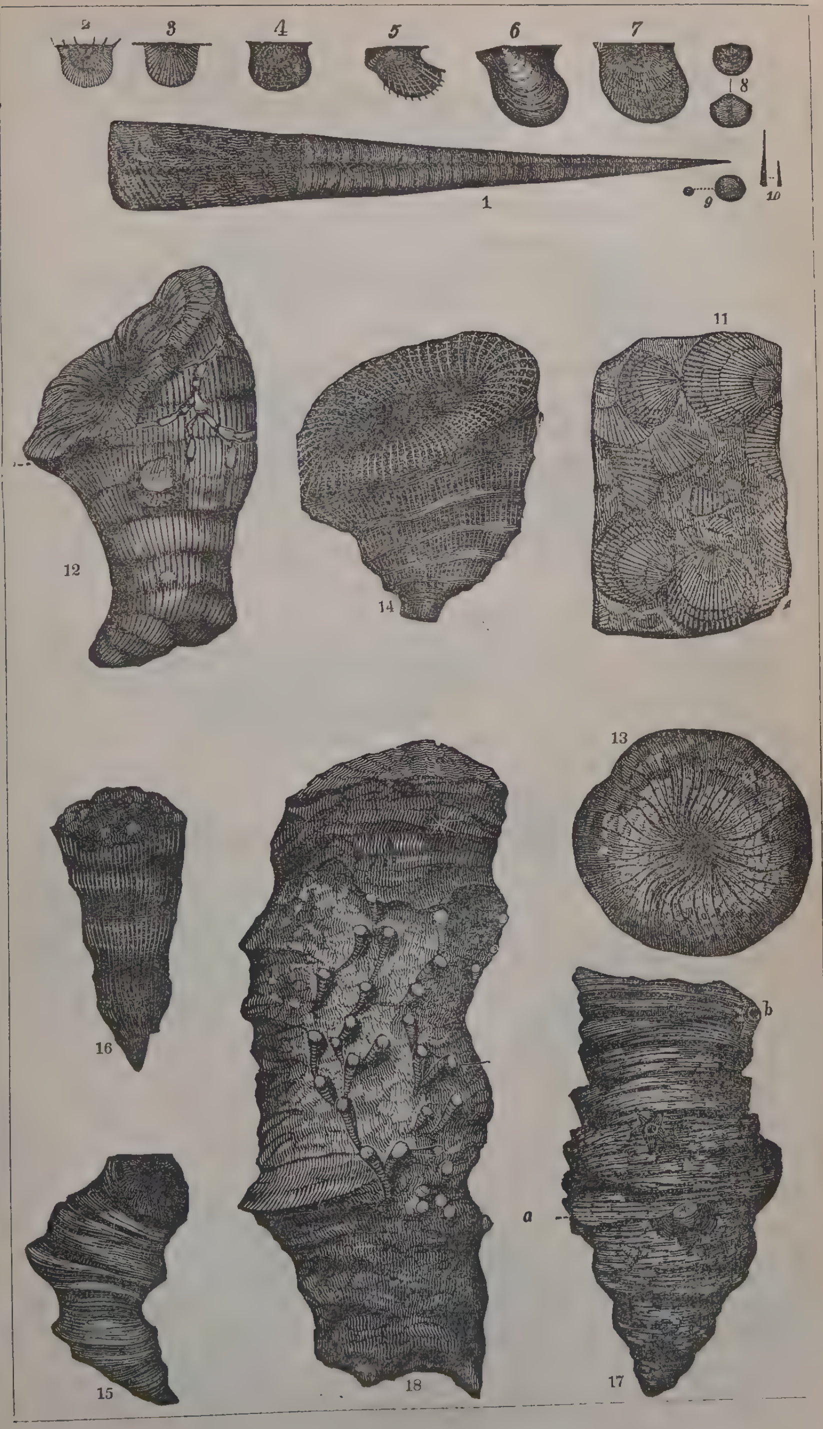
Fossils of the Marcellus shale.

1. ORTHOCERAS SUBULATUM.
2. STROPHOMENA SETIGERA.
3. S. MUCRONATA.
4. S. PUSTULOSA.
5. AVICULA MUCRONATA.
6. A. LÆVIS.
7. A. EQUILATERA.
8. ORTHIS NUCLEUS.
9. DISCINA MINUTA.
10. TENTACULITES FISSURELLA.
11. ATRYPA LIMITARIS.

Fossils of the Hamilton group (p. 67).

CORALS.

12. STROMBODES SIMPLEX (a small parasitic coral or bryozoon is attached on it).
13. Same, end or cup.
14. STROMBODES HELIANTHOIDES.
15. S. DISTORTUS.
16. S. RECTUS.
17. CYSTIPHYLLUM CYLINDRICUM.
18. Same? with another kind of coral (AULOPORA) attached.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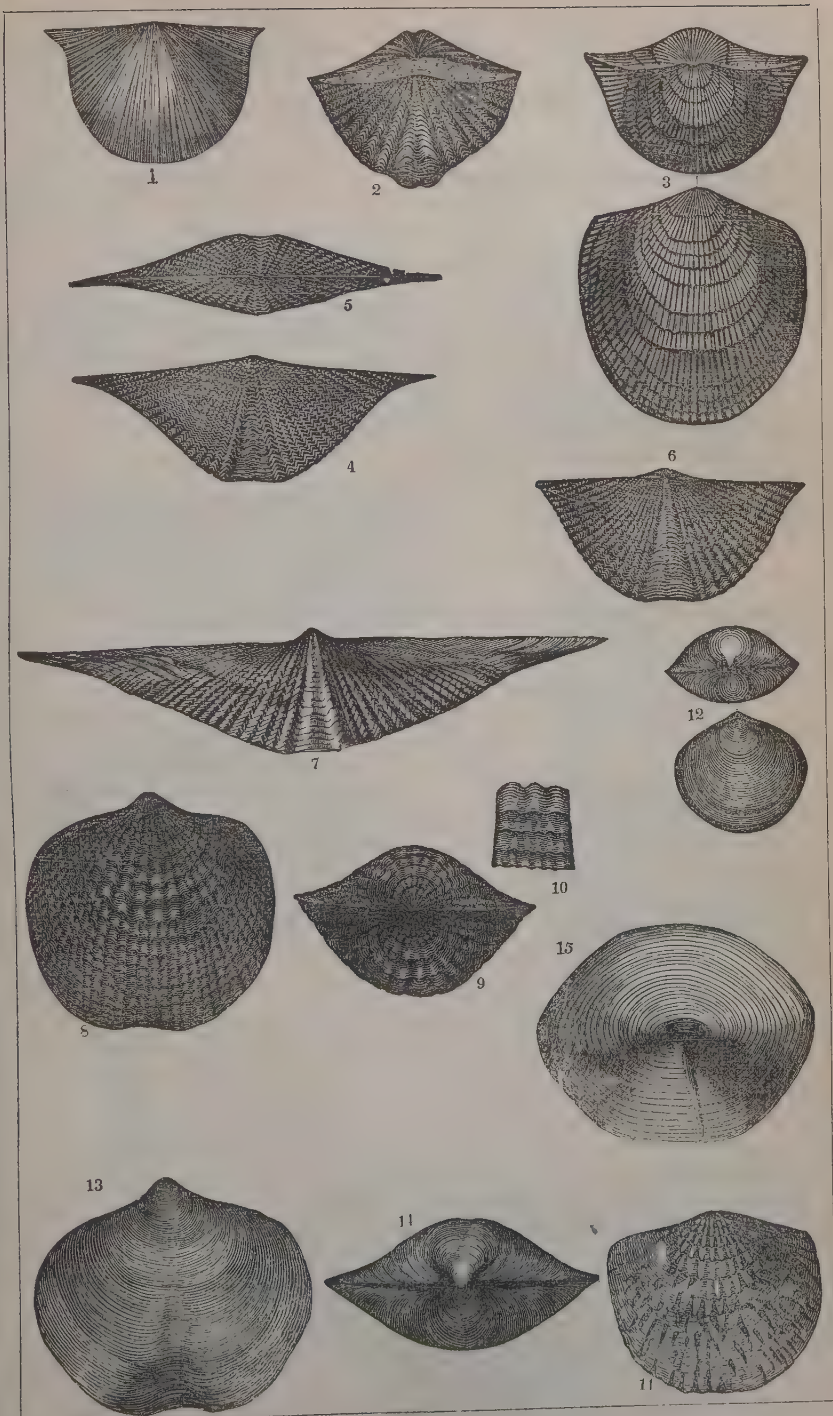
Shells of the Hamilton group.

BRACHIOPODA.

1. Strophomena inequistriata.
2. Spirifer zigzag.
3. Atrypa reticularis (p. 67).
4. Spirifer mucronatus, lower valve (p. 67).
5. Same, front view.
6. Same, shorter variety.
7. Same, very elongated variety.
8. Atrypa aspera.
9. Same, front view.
10. Same, magnified portion of surface.
11. Same, with the spines still adhering in parts.
12. Atrypa concinna.
13. A. concentrica, lower valve (p. 67).
14. Same, front view.
15. Discina grandis (p. 67).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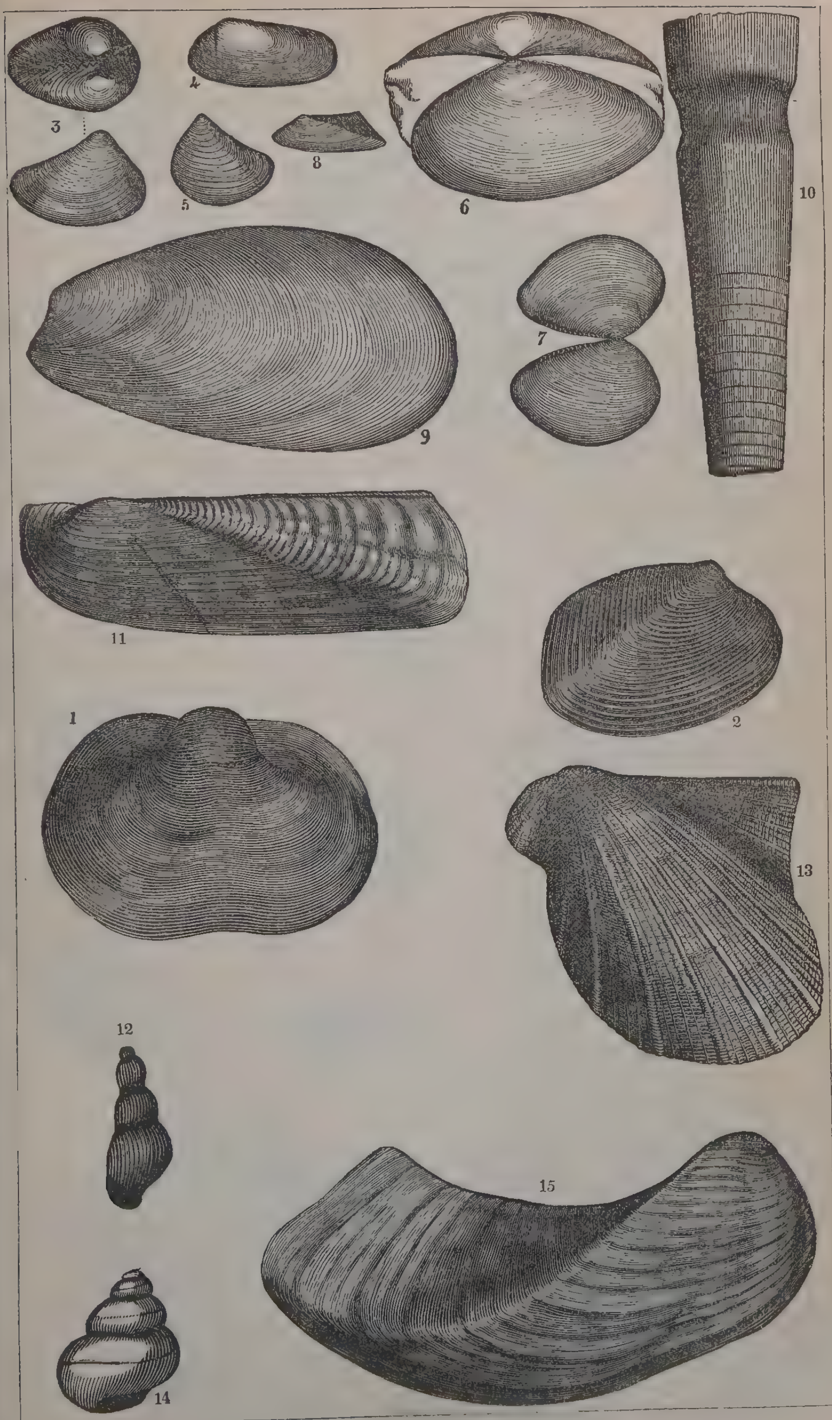
Fossils of the Hamilton group.

SHELLS.

1. Bellerophon patulus.
2. Microdon bellastriata.
3. Cucullæa opima.
4. Nucula oblonga (p. 67).
5. Nucula lineata.
6. Tellina ovata.
7. Nucula bellatula.
8. N. truncata.
9. Modiola concentrica.
10. Orthoceras constrictum.
11. Orthonota undulatum.
12. Loxonema nexilis.
13. Avicula flabella.
14. Turbo lineatus.
15. Cypricardites recurva.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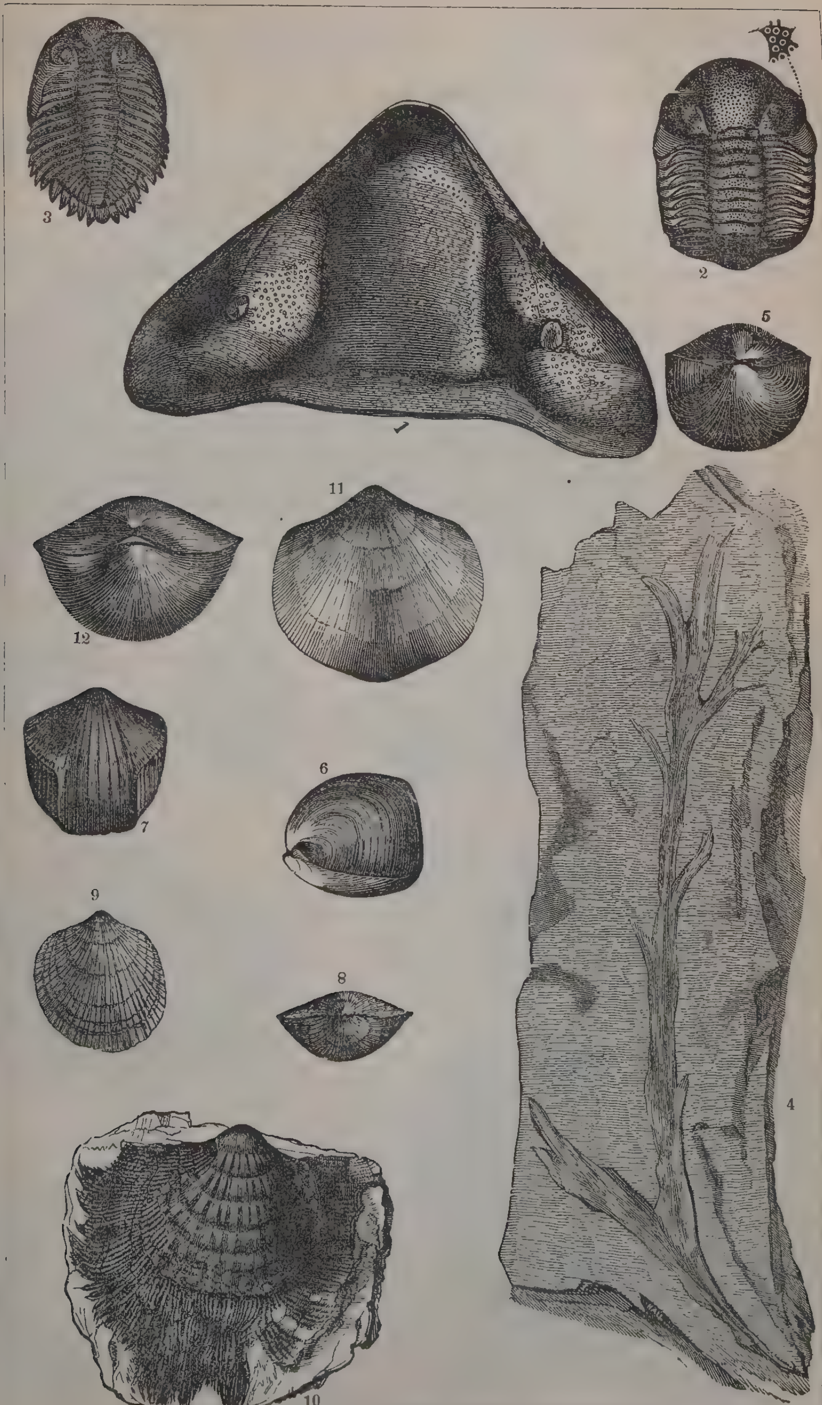
Fossils of the Hamilton group and Tully limestone.

1. Head of HOMALONOTUS DEKAYI.
2. PHACOPS BUFO, partly coiled or contracted. (A magnified representation of the lenses of the eye is given.)
3. DALMANIA CALLITELES.
4. Stem of plant, undescribed (p. 66).

(*The above are from the Hamilton group.*)

5. RHYNCHONELLA SUBCUBOIDES, front view (p. 68).
6. Same, side view.
7. Same, rear view.
8. ATRYPA LENTIFORMIS, front.
9. Same, lower valve.
10. ATRYPA AFFINIS (the fringe-like margin is the edge of the shell compressed).
11. ORTHIS RESUPINATA, lower valve.
12. Same, front view.

(5 *to* 12 *are from the Tully limestone.*)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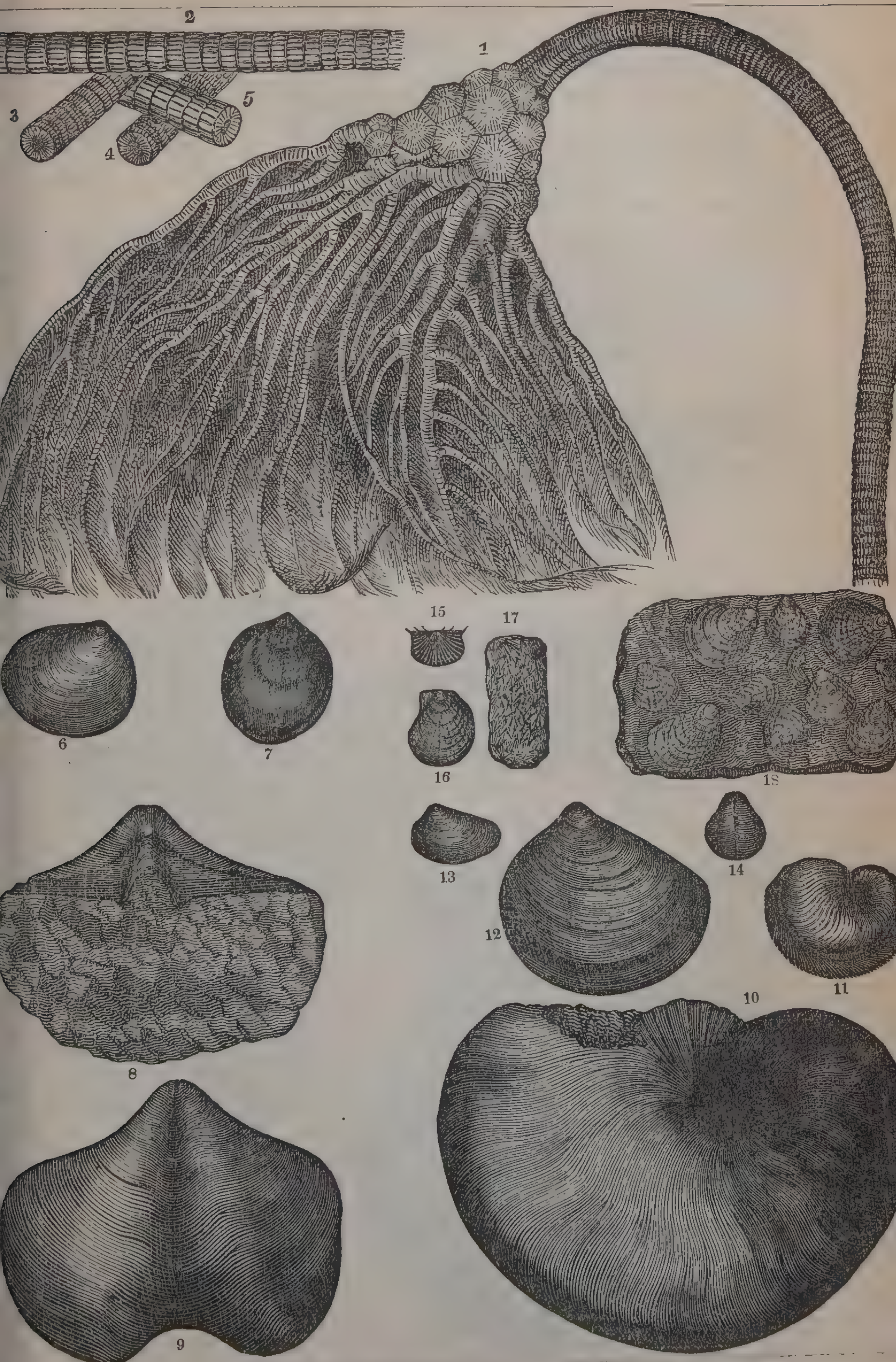
Fossils of the Portage group.

1. Crinoid : CYATHOCRINUS ORNATISSIMUS (p. 69, 47).
2, 3, 4, 5. Fragments of its stalk or column.
6. LUCINA RETUSA.
7. ORTHIS TENUISTRIATA.
8. SPIRIFER LÆVIS : beak, hinge, and triangular opening for the byssus (p. 40).
9. Same, outside of lower valve.
10. GONIATITES SINUOSUS.
11. G. BICOSTATUS.
12. ASTARTE SUBTEXTILIS.
13. NUCULA LINEOLATA.
14. BELLEROPHON STRIATUS.

Fossils of the Genesee slate.

15. CHONETES SETIGERA.
16. AVICULA FRAGILIS.
17. TENTACULITES.
18. Fragment, with AVICULA FRAGILIS.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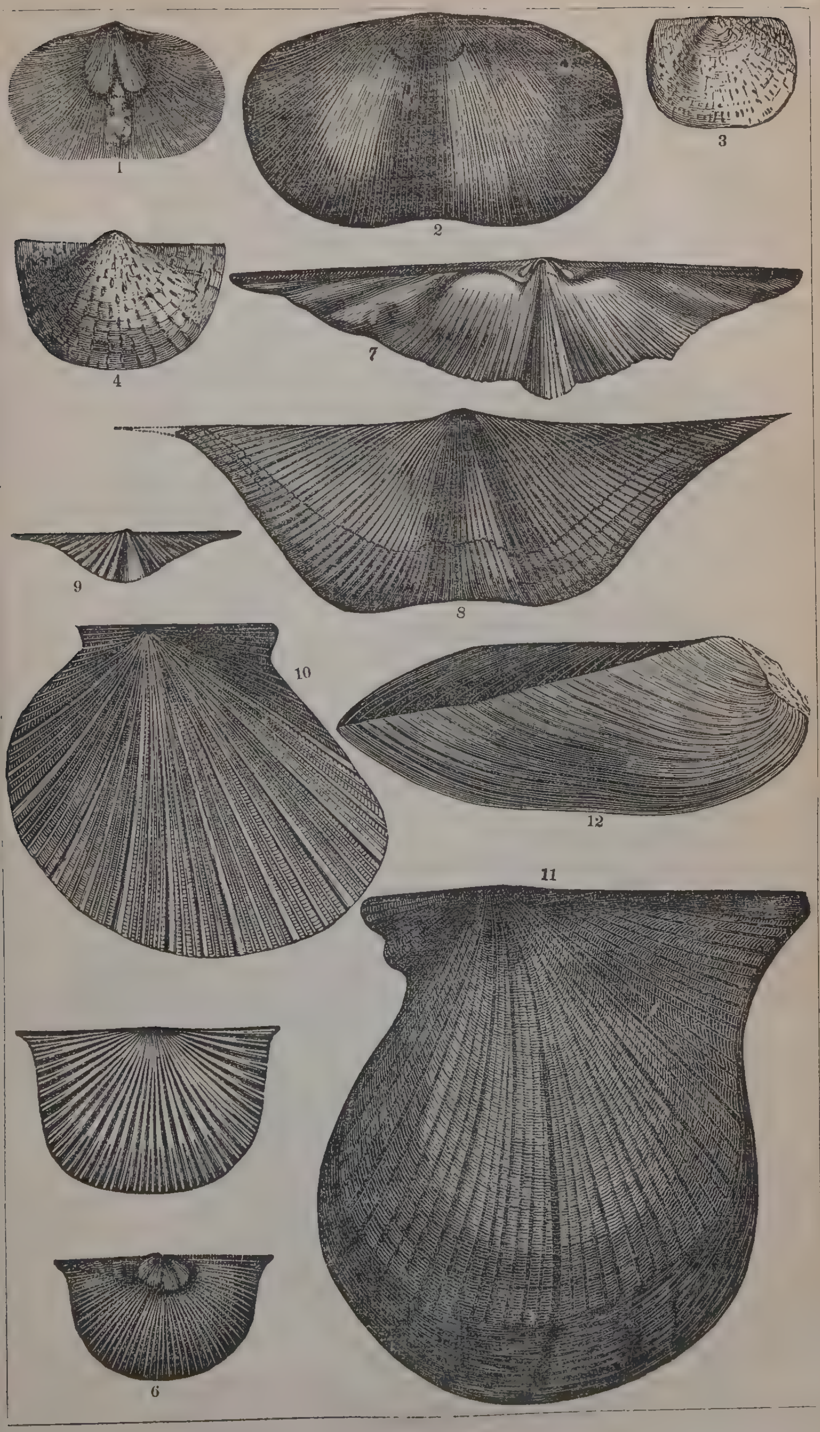
Fossils of the Chemung group.

1. ORTHIS INTERLINEATA?
2. O. CARINATA.
3. PRODUCTUS (STROPHOMENA) MEMBRANACEA.
4. Same, upper valve.
5. STROPHODONTA BIFURCATA.
6. S. INTERSTRIALIS?
7. SPIRIFER PROLATUS.
8. S. CUSPIDATUS.
9. S. ACUMINATUS.
10. AVICULA TRICOSTATA.
11. A. PECTENIFORMIS.
12. CYPRICARDITES CHEMUNGENSIS.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Fossils of the Chemung group.

FERN.

SPHENOPTERIS LAXUS (p. 76).

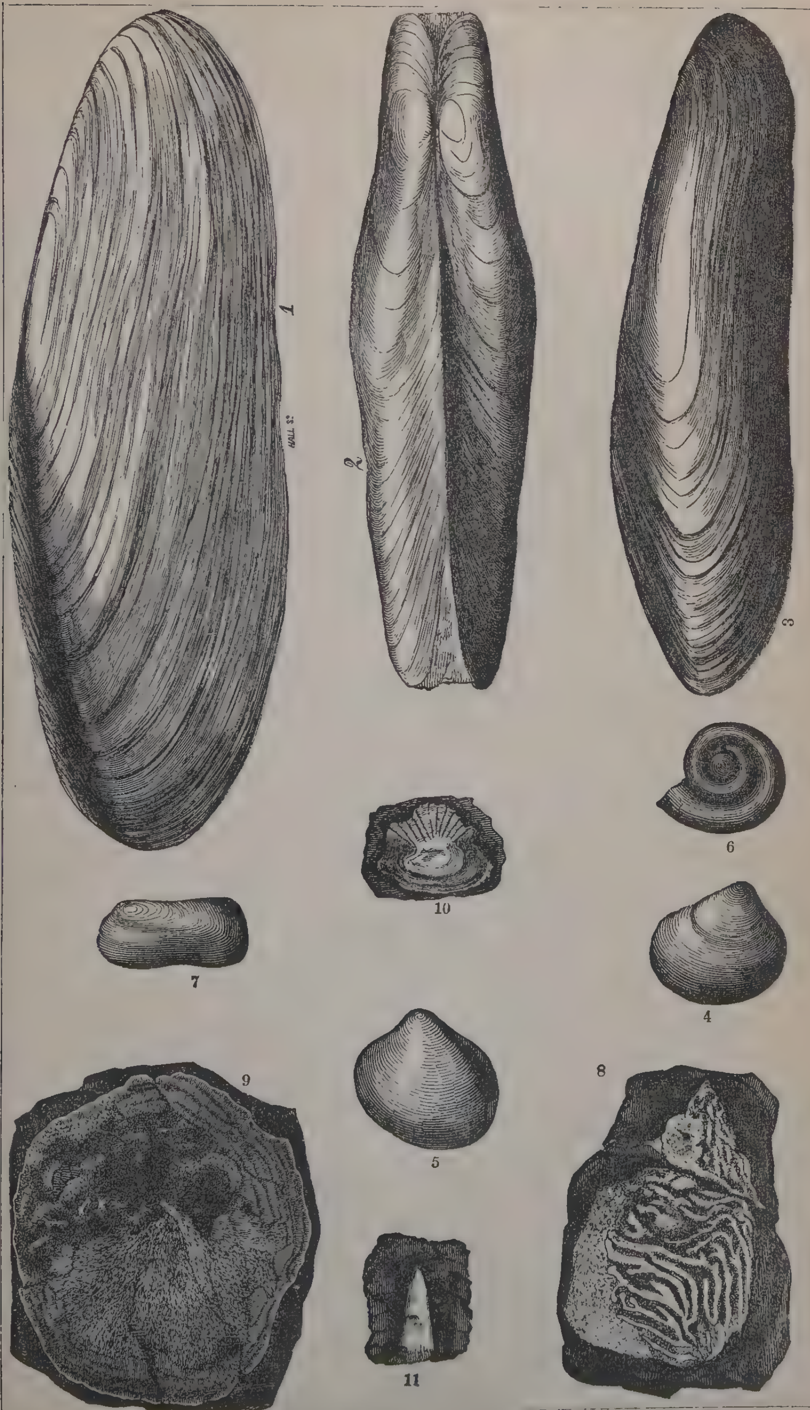
Fossils of the Catskill group and Carboniferous conglomerate.

1. MODIOLA? CATSKILLENSIS.
2. MODIOLA? ANGUSTA.
3. Same, back of shell.
4. CYPRICARDITES? RHOMBEA.
5. Same.
8. Scale of fish (HOLOPTYCHIUS).
9 Do. (HOLOPTYCHIUS TAYLORI).
10. Do. do.
11. Tooth of fish.

(*The above from the Catskill group*, p. 70.)

6. EUOMPHALUS DEPRESSUS.
7. CYPRICARDITES CONTRACTA.

(*From the Conglomerate*, p. 71)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(C.)

CONTRIBUTIONS

TO

PALÆONTOLOGY.

Being some of the Results of Investigations made during the years 1859 and 1860,

BY

JAMES HALL.

OBSERVATIONS

Upon some new and other species of Fossils, from the rocks of Hudson-river group of Ohio and the Western States; with descriptions.

[Continued from page 121 of the 13th Annual Report of the Regents of the University on the State Collections of Natural History.]

ORTHIS JAMESI (new species).

Shell transversely semielliptical: hinge-line equalling, or a little greater than the width of the shell below; the length a little more than half the width, and sometimes nearly two-thirds. Cardinal extremities compressed, and usually truncate or rounded. Dorsal valve convex, becoming gibbous, with a shallow often scarcely defined sinuosity in the middle: hinge-line slightly rising towards the beak, which is not incurved; area narrow, but distinctly defined: foramen broad, and showing a narrow process which rises as high as the plane of the area. Ventral valve much elevated towards the beak; the sides somewhat flattened, and the middle sometimes a little depressed towards the front; the beak slightly arcuate, and the wide area nearly flat and moderately inclined backwards: foramen large, and extending to the apex.

Surface marked by twenty to twenty-four simple, strongly rounded, slightly arching primary striæ, which, by intercalations of secondary striæ, are often increased to twice that number on the margin.

Often the striæ are simple throughout, and, when well preserved, are always marked by fine thread-like concentric striæ, and towards the margin by a few lamellæ of growth.

This species, in general form, resembles *O. plicatella;* but the area is much larger, and extends to the salient cardinal extremities; while in

that species the extremities are usually rounded, and the shell a little rounded below.

Geological formation and locality. In the calcareous shales of the age of the Hudson-river group: near Cincinnati, Ohio. Collection of S. T. CARLY.

ORTHIS CLYTIE (n. s.).

SHELL larger than medium size, semielliptical, the length and breadth about as 4 to 5, or as 7 to 9, plano-convex or concavo-convex: hinge-line less than the greatest width of the shell; cardinal extremities rounded. Dorsal valve flat or concave, with a longitudinal depression along the centre; cardinal area linear, not incurved. Ventral valve moderately convex, sometimes more elevated or subangular along the middle towards the beak: area narrow, longitudinally striated, and extending little more than two-thirds the width of the shell; foramen wide; beak scarcely incurved. Muscular impression deeply divided; in the middle of the inner division of each lobe, more deeply impressed, and extending two-thirds the length of the shell from the beak; the outer portions flabellate, and margined by an elevated ridge; the whole interior surface granulose, and the visceral area margined by a thickened elevation, which becomes, in old shells, a defined ridge. The striæ are shown along the inner margin.

In the dorsal valve the inner surface is finely striato-granulose, and outside of the submarginal ridge the striæ are stronger. The muscular impression is comparatively small, distinctly circumscribed, with central ridge, thin prominent cardinal process, and strongly defined dental fossets and corresponding crural processes.

The surface is finely and somewhat evenly striated; the striæ on the ventral valve often more prominent than those on the dorsal valve.

This is a very well-marked and distinct species, which, in the deeply bifid muscular impression, differs from any other species known to me in this group of strata; while in other features, it is readily distinguished.

Geological formation and locality. In strata of the age of the Hudson-river group; in Kentucky. Received from David Christy, Esq., of Cincinnati.

I have under consideration several species of Orthis from the shales of the Hudson-river group, which have been placed in my hands by Mr. Carly of Cincinnati. Two of these are of the type of *O. occidentalis* and *O. sinuata*, etc.; and since the entire characters and degree of variation of these forms have not been fully determined, I hesitate to designate other species until I have a larger collection for comparison. I take this occasion, however, to say to those palæontologists who have regarded the three species of this type described in Vol. I, Pal. N. Y., as one species, and identical with *O. porcata* of Europe, that in my collections may be found specimens of the type which can only be referred to three distinct species; for the illustration of which, I hope to procure the separated valves to show the interior markings. In the mean time, I shall feel under obligations to any persons who can aid me in obtaining other specimens for the more satisfactory determination of this question.

CYCLONEMA VENTRICOSA (n. s.).

Shell turbinate; height and greatest breadth about equal. Spire consisting of about four volutions, which increase rapidly in size, the last one extremely ventricose; the lower side somewhat flattened near the upper part of the columella, which is straight and thickened. Aperture as wide as high, transversely semioval.

Surface marked by strong revolving striæ, about three of which on the upper volutions, and four or more on the last volution, become more strongly developed, and give a subcarinate form to the volutions; between these, the striæ are fewer and unequal. The revolving striæ are crossed by finer lines of growth, which on the upper volutions are nearly uniform, but towards the aperture become crowded, unequal and sublamellose.

This species resembles the *Pleurotomaria* (*Cyclonema*) *percarinata* of the Trenton limestone, but is more ventricose, with different surface

markings. It is large, more ventricose, and very differently marked from *C. bilix*, which occurs in the same formation.

Geological formation and locality. In the shales of the Hudson-river group : in Ohio and Tennessee.

CYCLONEMA BILIX (CONRAD).

Since the preceding description was written, Mr. S. T. CARLY of Cincinnati has placed in my hands a series of specimens of the above species; or, more properly, specimens which are usually referred to *C. bilix*. These were collected at various altitudes in the shaly limestone from the river level at Cincinnati, to beds which are 700 feet above that horizon. Although I am able to indicate differences in the individuals, and those from the greatest altitude present some marked peculiarities, still I am at this time unable to point out characters which can be relied upon for specific distinction. More extensive collections may prove that there are three species within the vertical range of 700 feet. A careful collection of these forms, whether they may prove to be of distinct species or only varieties, will be of great interest in showing the influence of time, and the gradual changes which the ocean bed may have undergone during the long period of quiet accumulation of seven hundred feet of fine sediments, every foot of which is filled with the remains of these former creations. We are already aware that in the upper beds of this extensive group, there is an accession of several species of Brachiopoda which are unknown in the lower beds.

NOTE ON THE GENERA BELLEROPHON, BUCANIA, CARINAROPSIS, AND CYRTOLITES.

(See Vol. I, Pal. N. York.)

Pictet, in his very valuable work "*Traité de Paléontologie*," has united, under the Genus Bellerophon (Montfort), the typical form of that genus, together with Bucania, Carinaropsis and Cyrtolites. It is true that the principal distinctive feature of the *Bucania* is the open umbilicus, showing the volutions together with an exterior carina along the dorsal line, corresponding to a channel on the inner side; and the lip terminating in a deep sinuosity, and usually abruptly expanded; while the lateral and posterior parts of the lip are often much thickened, as is shown in nearly all the good specimens of *B. troosti* of D'Orbigny, a lower silurian form from Tennessee. Since this type is well known, I shall not at present contend for the generic distinction, believing that it will ultimately be found a useful designation.

The Genus Carinoropsis was founded upon the external characters, presented by a few specimens. These are, the usually attenuated spire, the abruptly expanding body volution, and shallow cavity, giving the shell a patelloid aspect. To this may be added the character (perhaps not constant) of an attenuated carina upon the dorsum. The shells are usually thin.

The interior of the established species has not been determined, and I do not know whether or not they present differences from the ordinary *Bellerophon*.

Among some collections presented to me some time since by Prof. Safford, State Geologist of Tennessee, and many others more recently received (Oct. 1860) from Mr. S. S. Lyon of Jeffersonville, Indiana, are several specimens having the form and exterior character of those specimens referred to Carinaropsis. The outer or body whorl beyond the columella for nearly half a volution is extremely expanded, the first volutions contracted and forming a very inconsiderable proportion of the whole. In these specimens the cavity presents a kind of septum as in Crepi-

DULA, extending from the posterior side one-third the distance across the cavity. This septum is marked on the lower side by a strong carina, and is concave above; the margin a little thickened as if from the folding over of the shelly laminæ, and posteriorly spreading over the volution behind in a callosity, like many of the BELLEROPHON. This septum is a very peculiar feature, and, taken together with other characters, I conceive to be of sufficient importance to warrant the separation from BELLEROPHON. Should this prove to be identical with those which I have designated as CARINAROPSIS, that generic term will have precedence; but should this important character not be found in those forms, I propose for those now under consideration the generic name of PHRAGMOSTOMA, from the septum within the aperture.

CARINAROPSIS (PHRAGMOSTOMA) CYMBULA (n. s.).

VOLUTIONS about two, enrolled in the same plane, very abruptly expanding beyond the first volution, which is minute: width of the aperture more than twice as great as the depth of the cavity; length of the septum about half as great as the width, longitudinally carinate on the lower side and plane concave above, the posterior lip not reflected over the spire. The dorsum is marked with an elevated band, scarcely carinate, having sometimes a faint groove in the centre and one on each side. Striæ of growth well defined, indicating a deep sinus at the anterior margin.

This species is sometimes distorted and the small spire broken or eroded, when it very much resembles a CREPIDULA. One specimen, when entire, has had an aperture at least an inch and a half in diameter.

Geological formation and locality. In strata associated with *Cyrtolites ornatus*, and other fossils of the Hudson-river group, on the Ohio river below Louisville. From Mr. S. S. LYON.

CARINAROPSIS (PHRAGMOSTOMA) CUNULÆ (n. s.).

VOLUTIONS two or more, the last one abruptly expanding, the greatest expansion being two or three times as great as the

depth of the cavity : depth of cavity, directly below the anterior margin of the septum, about equal to half the width of the septum; septum sharply carinate on the lower side, with a slight continuation of the same feature on the upper side, which is concave; posterior lip reflected, often somewhat abruptly truncated in the middle behind, and extending over the back of the volution. Dorsum angular, not distinctly carinated behind, and gradually flattening towards the anterior margin, which is deeply sinuate. Surface finely striate in the direction of the lines of growth.

This species differs from the preceding in having the first volution and the first part of the second volution proportionally larger, the lip more abruptly deflected; while the carination of the lower side of the septum marks the anterior edge, and dies out upon the upper surface. The exterior striæ are less lamellose, and the cavity of the outer volution somewhat deeper.

In some specimens of this species, the aperture has been from three-fourths of an inch to an inch in diameter.

Geological formation and locality. In strata of the age of the Hudson-river group, near Nashville, Ten. From Prof. SAFFORD.

Related apparently to the forms just noticed, but still farther removed from the true BELLEROPHON, are those shells which have sometimes been referred to CLIO or CLEODORA. These forms, so far as I know, are all from the Lower Silurian rocks, occurring in the Trenton limestone and associated strata in New-York, Canada and the Western States. These shells have usually a somewhat triangular form, with a rounded sinuate base, or more rarely a subcircular outline. From their external form and appearance, as they usually adhere to the stone by the inner or aperture side, one might fancy them to be expanded carinate *Bellerophontides* with small apices, which had been vertically compressed. There is usually a strong sharp carination on the back, extending from the apex to the aperture. The apex is incurved and pointed, but I have not been able to discover any volutions.

The shell is composed of two plates; the inner one a plane concave expansion extending the entire width of the shell, and, joining the lateral margins of the outer or carinate portion,

extending usually more than half the entire length, and leaving a shallow cavity between the outer shell and the partition which sometimes extends nearly to the margins on either side, but is occasionally contracted by the junction of the septum with the outer shell at a distance from the margin.

I conceive that these forms are quite distinct from the BELLEROPHON; while, in the character and substance of the shell, I can see no reason to unite them with the CLEODORA. I therefore prefer for them the generic name of CLIODERMA.

CLIODERMA (new genus).

SHELLS more or less arcuate, somewhat calyptræform, subtriangular or oval, with the apex marginal and incurved in the same plane, not known to be convolute, carinate upon the back, abruptly and broadly expanding, with the anterior margin sinuate; interior concave, much wider than deep. A concave shelly partition covers the posterior half or more of the cavity. Substance of the shell of moderate thickness, lamellose, with surface lamellose-striate parallel to the exterior margins or lines of growth. Shells heretofore referred to CLEODORA, SPIRIFER, &c.

CLIODERMA SAFFORDI (n. s.).

SHELL arcuate; apex much incurved : exterior form ovate-triangular; the sides, from the apex to the middle, somewhat straight or slightly concave, rounded below, with a deep sinuosity in front. Dorsum strongly carinate; the substance of the shell being bent abruptly outward, so that the carination affects the form of the internal cavity. Shell-partition extending from the apex two-thirds the length of the shell, regularly concave on the exterior side, and without apparent carina on the lower side. Surface strongly lamellose-striate. Width about one inch and a half; nearly the same length.

Geological formation and locality. In Lower Silurian strata : Lebanon, Tenn. From Prof. J. M. SAFFORD.

CLIODERMA CANALICULATA (n. s.).

Shell subovate, triangular, subarcuate; the sides nearly straight, or sometimes a little concave from the apex to the middle of the shell or below: apex moderately incurved. Dorsum abruptly and strongly carinate from the apex; the carina gradually expanding towards the front, which is deeply sinuate: ventral partition extending more than halfway from the apex to the front. Interior cavity shallow, modified by the form of the carina. Surface marked by flattened lamellose striæ, which are parallel to the margin and abruptly arching backwards on the carina.

In the best preserved specimens there is a shallow groove or depression parallel to the lateral margins, and apparently along the line of junction between the outer shell and the partition; but as none of the specimens are entire, the relations of this feature are not fully determined.

CLIODERMA UNDULATA (n. s.).

Shell subcircular or broadly subelliptical, moderately and equally convex; length and width about as eleven to twelve; margin curved from the apex, and broadly rounded in front; apex short, and but moderately incurved; central carina unknown; the ventral partition extending more than half way from the apex to the front of the shell, but apparently uniting with the shell considerably within the lateral margins; visceral cavity very shallow. Surface marked by strong concentric undulations, with finer parallel striæ.

This species is distinguished from the two preceding by its nearly orbicular form, little extension of apex, rounded postero-lateral margins, and broad undulations of surface.

Geological formation and locality. In Trenton limestone: at Watertown, N. Y.

CLIODERMA ANATIFORMIS.

Tellinomya anatiformis : Pal. New York, Vol. I, pa. 154, pl. 34, f. 7.

This specimen is essentially a cast, with little of the shell remaining, and has the appearance of a bivalve shell. The inequilateral character is due to distortion from pressure, and partly to the imperfect separation of the specimen from the adhering rock. The divergent grooves are apparently caused by the thickening at the junction of the ventral partition with the outer shell. The species is extremely broad, and the postero-lateral margins are much expanded. A small portion of the shell towards the apex shows a sharp dorsal carina.

Geological formation and locality. In Trenton limestone : Watertown, N. Y.

CLIODERMA EXPANSA.

Delthyris expansus : EMMONS, Geol. Report Second District, p. 397, f. 2.

This fossil belongs to the Genus CLIODERMA, having a great lateral expansion and a very strong dorsal carina.

I have before me an imperfect specimen apparently of this species, which has a length of more than an inch and three-fourths on the carina.

Geological formation and locality. Same as the preceding.

CLIODERMA ATTENUATA.

Clioderma attenuata : Geol. Report of Wisconsin.

This species, of the Trenton limestone in Wisconsin, is ovate-triangular in form, the dorsum abruptly and prominently carinate, the cavity very shallow, and the apex attenuate.

The casts of this species show a feature which is apparently of generic importance. The apex of the cast is trifid, from two parallel short vertical septa which divide this portion of the shell into three divisions for a short distance below the summit.

This species resembles the *C. canaliculata* in form, but has no depressions of the shell parallel to the sides, and the surface is apparently less distinctly striated.

Geological formation and locality. In Trenton limestone of Wisconsin.

DESCRIPTIONS

Of New Species of Fossils from the Upper Helderberg, Hamilton and Chemung groups; with observations upon previously described species.

[Continued from page 94 of the preceding Report.]

PRODUCTUS DUMOSUS (n. s.).

Shell subovoid, arcuate. Ventral valve broadly gibbous, with beak incurved. Surface marked by strong radiating ridges, which gradually become stronger, and terminate abruptly in long tubular spines rising almost vertically from the surface: interstitial ridges of the same character mark the surface in successive ranges, so as to give a tolerably regular series of spines, of which there are as many as ten ranges. The surface is otherwise marked by fine concentric undulating striæ. Dorsal valve unknown.

This species has a length of one inch, with a width of three-fourths of an inch: the height or depth of the ventral valve is more than half an inch. It is quite distinct from any other species known to me in strata of this age.

Geological formation and locality. In shales of the Hamilton group: near Canandaigua lake.

ATHYRIS ANGELICA (n. s.).

Shell ovoid, gibbous, elongate; width and length about as six to seven, or twelve to fifteen. Ventral valve most convex above the middle, marked throughout its length by a strongly defined and abruptly depressed mesial sinus, which becomes somewhat suddenly expanded on the lower third of the shell: sides of the shell gibbous, and abruptly curving to the margins; beak extended and incurved. Dorsal valve much shorter

than the opposite, gibbous, transverse, or as wide as long: mesial fold usually not defined above the lower third of the shell; its place above this being indicated by the straightness of the striæ and sometimes by a little greater gibbosity: hinge line short; the cardinal extremities rounded.

SURFACE marked by fine regular lamellose striæ, the edges of which are sometimes projected.

The distinguishing feature of this species, when compared with the three species known in the Hamilton group, is the great inequality of the valves. The band-like or lamellose striæ are not unlike the *A. vittata*, but the elongate ventral valve and angular sinus are very distinctive features. Internal casts of the species are strongly marked by the generic characters of ATHYRIS.

Geological formation and locality. In the Chemung group: Philipsburgh, Alleghany county, and elsewhere.

MERISTELLA ELISSA (n. s.).

SHELL subovoid; length and width of the body of the shell subequal, with a linguiform extension in front. Ventral valve gibbous and extremely arcuate, the umbo much elevated, and the beak incurved over the dorsal valve: the greatest gibbosity of the valve is a little below the beak of the dorsal valve; the base extended in front, with scarcely a sinus. Dorsal valve depressed-convex below the middle, a little gibbous above, broadly expanded laterally, and extended in front into a broad linguiform process.

SURFACE marked by fine concentric striæ, with stronger lamellose elevations at intervals, and obscure radiating striæ crossing these.

The specimen described has a length of one inch and eight-tenths, and, below the beak of the ventral valve, is about one inch and four-tenths; while the greatest width across the middle of the shell is more than one inch and five-tenths. The width of the linguiform process, in the middle of its extension, is about seven-tenths of an inch.

This species is distinguished from *M. nasuta* of CONRAD by its larger size, comparative flatness of dorsal valve, and broad extension in front; while in that species it is narrow, and more incurved and elevated in front.

Geological formation and locality. In the Schoharie grit: Helderberg mountains.

TREMATOSPIRA HIRSUTA.

Atrypa hirsuta : HALL, Tenth Annual Report of the Regents, p. 128.

This species, which I referred to the Genus ATRYPA on account of its general form and finely plicated surface, proves to belong to the Genus TREMATOSPIRA; the interior showing spiral appendages, as in the already described species of that genus. This then makes two species of the genus in the Hamilton group.

The *Atrypa uniangulata* of CONRAD has heretofore remained without the means of determining its structure; but during the present year, 1860, I have, through the kindness of Mr. S. S. LYON, been furnished with the separated valves of a well-preserved individual. The ventral valve bears essentially the character of MERISTELLA; while the cardinal process in the opposite valve is quite peculiar, rising above the level of the hinge-line, and approaching in form the corresponding part of RHYNCHOSPIRA, preserving at its base the commencement of the crural processes. Another specimen shows the presence of internal spires arranged as in SPIRIFER. These characters ally it with TREMATOSPIRA, but the structure of the shell is distinctly fibrous; and in this respect, and in the character of the muscular impression, it is more nearly allied to MERISTELLA; while in the cardinal process, muscular impression, and absence of lamellose structure, it differs from ATHYRIS.

Should farther examination prove these differences to be of generic importance, it may form a subgenus, for which I suggest the name GONIOCŒLIA.

In the preceding Report, I have described as TEREBRATULA, *T. lincklæni*, *T. rectirostra*, *T. lens*, and *T. planirostra*; suggesting at the same time that, since the internal structure is unknown, they may prove distinct from that genus. Even before the Report was published, I had satisfied myself that these forms were not true TEREBRATULA. The muscular impressions left upon the shell so nearly resemble those of RENSSELÆRIA, that it might be inferred from the cast that the species belonged to this genus. The exterior form and the extension of the beak give them a different aspect; and the absence of longitudinal or radiating striæ is likewise opposed to the known forms of that genus, with one exception.

These forms begin their existence in the Lower Helderberg group, where I know a single species, while the type becomes farther developed in the Upper Helderberg and Hamilton groups. For these fossils, I propose the name of CRYPTONELLA.

CRYPTONELLA (n. g.).

SHELLS equilateral, inequivalve, elongate, oval or ovoid; valves unequally convex, without median fold or sinus, or with this character moderately developed and principally towards the base of the shell. Ventral valve with beak extended or incurved, perforate; foramen terminal, the lower side formed by two small triangular deltidial pieces, or, in their absence, by the umbo of the opposite valve. Shell-structure finely punctate. Surface smooth, or with concentric striæ. Valves articulating by teeth and sockets, the dental lamellæ of the ventral valve extending downwards into the cavity of the shell. The muscular impressions in the dorsal valve are strongly marked above, and extend in two narrow separated impressions more than halfway to the front of the shell : the ventral sinus shows elongated muscular and vascular impressions.

The species of this genus are more elongate than MERISTA and MERISTELLA, and those now known are less distinctly marked by mesial fold and sinus; while the beak is more attenuate, often a little flattened, and rarely so closely incurved, as in the genera cited. The punctate structure of the shell is a distinguishing character.

CENTRONELLA IMPRESSA (n. s.).

SHELL subtriangularly ovoid, elongate; width and length about as seven to nine. Ventral valve convex, much elevated or subangular in the middle, with sides abruptly sloping to the margins, sinuate in front; beak extended and nearly straight. Dorsal valve slightly concave in the upper and middle portions, with usually an impressed line down the centre, abruptly inflected at the sides and less abruptly in the front, which is produced in a short process filling the sinus of the opposite valve. Surface finely striate concentrically, with faint remains of extremely fine radiating striæ, which are visible only under a lens : entire surface finely punctate.

The interior of the ventral valve shows two strong teeth much below the beak, with an elongate triangular foramen reach-

ing to the beak. The dorsal valve shows the dental sockets, with a strong thickened process which is deeply concave in the centre from which proceeds the crural processes.

I refer this to the Genus CENTRONELLA of BILLINGS, from its similarity to *C. glansfaga;* but it is to be regretted that the figures given to illustrate the generic character are extremely unsatisfactory.

Of the Lamellibranchiata of these groups, Mr. CONRAD has described about eighty species; and, including those described by others, we have nearly one hundred known species of these fossils. A considerable number of these remain to be identified. Several species of Gasteropoda have been described, among which are *Platyceras sulcatus, P. cirriformis, P. subundata, P. erecta; Platyostoma lineata; Pleurotomaria poulsoni, P. unisulcata, P. capillaria, P. sulcomarginata, P. rotunda*; *Bellerophon unisulcata, B. brevilineatus.*

The following species have not been described:

MURCHISONIA MAIA (n. s.).

SHELL elongate, turritiform : spire consisting of seven or eight (or more) volutions, which are regularly convex and gradually expanding from the apex, the last volution somewhat more ventricose than the preceding; aperture broadly oval, a little longer than wide, the columella extended below. Surface marked by transverse threadlike striæ, bent backwards on the centre of the volution by an elevated revolving band, which is tricarinate, with depressed lines between. Summit of the volutions canaliculate just below the suture; the striæ bending forward from the suture, and backward as they pass the limit of the groove. Length from one to two inches or more.

Geological formation. Upper Helderberg limestones.

MURCHISONIA LEDA (n. s.).

SHELL elongate, terete or subfusiform : volutions somewhat rapidly expanding, convex, the last two a little more expanded; aperture elliptical. Surface of volutions marked by elevated

threadlike striæ, which, on the upper side of the volution, are vertical, but turn gently backwards towards the centre, which is marked by a flat revolving band. Length from one to two inches.

This species resembles the preceding, a variety of which I had formerly considered it; but the absence of the canaliculation at the summit of the volution, the more depressed convexity and greater attenuation of the volutions, giving a more elongate aperture, are characters which appear sufficient for specific distinction.

Geological formation. Upper Helderberg limestones.

LOXONEMA PEXATA (n. s.).

SHELL elongate, terete or subfusiform : volutions six or more, gradually expanding from the apex, somewhat flattened towards the upper side, or a little concave just below the suture, and most convex below the middle, last one ventricose; aperture elliptical. Surface marked by regular elevated transverse striæ, which, at the summit of the volution, bend a little backwards, and again curve forwards above the greatest convexity of the volution.

Geological formation and localities. In limestone of the Upper Helderberg group : throughout New-York and in Ohio. This species of LOXONEMA, and the two preceding species of MURCHISONIA, are not unfrequently associated together; and as the specimens are usually in the condition of casts of the interior, it becomes very difficult to distinguish the one from the other, more particularly where they have suffered pressure and distortion.

LOXONEMA BELLATULA (n. s.).

SHELL moderately elongated, somewhat conical : volutions few, rapidly expanding from the apex; last volution ventricose, obtusely angular a little below the middle; aperture transverse. Surface of volutions marked by transverse undulating striæ, which have their greatest retral curve just above the

suture in the first volutions, and a little above the obtuse angle on the last volution.

This species, occurring with the preceding, is readily known by its shorter spire and obtuse angularity of the last volution.

Geological formation and locality. Upper Helderberg limestone, Ohio.

PLEUROTOMARIA KEARNYI (n. s.).

SHELL large, trochiform. Spire short, consisting of three or four volutions, which rapidly increase in size from the apex: upper volutions depressed-convex on the sides; the suture somewhat canaliculate, and carinate above by the base of the volution; the last volution flattened on the upper third, prominent above the middle and flattened on the lower half, marked just above the base by a strong simple angular carina : lower side of the volution prominent in the middle, depressed towards the umbilicus; aperture transverse, somewhat semioval. Surface marked by strong unequal striæ, which bend slightly backwards from the suture, and, in passing the upper more prominent part of the volution, curve a little forward, but do not become vertical; bending abruptly forward on the carina, again curve a little forward, and then backward into the umbilicus.

This shell reaches the dimensions of more than two inches in height by three inches in diameter on the base, while some individuals are four inches across the base.

Geological formation. Upper Helderberg limestone.

PLEUROTOMARIA HEBE (n. s.).

SHELL conical, hemispheric, rounded upon the lower side; the volutions above flattened, and nearly in the same plane from the apex to the outer edge of the last volution; the spire above the aperture about equal to the height of the aperture. Volutions about four, very gradually expanding to the last one, which is ventricose and angular on the outer margin;

aperture transversely elliptical. Surface marked by strong revolving striæ and finer transverse striæ, which are strongly bent backward on the carina of the outer volution.

This species is larger and more rotund than *P. sulcomarginata* of the Hamilton group. The specimens examined are all imperfect, and the shell crystalline, so that the surface markings are indistinctly seen.

Geological formation and locality. In limestone of the Upper Helderberg group: Western New-York.

PLATYOSTOMA TURBINATA (n. s.).

SHELL depressed subturbinate, sometimes approaching to globose. Spire depressed, little elevated above the outer volution, and sometimes nearly on a plane with it. Volutions three or four, very rapidly expanding; the last one extremely ventricose, and the lower part projected downwards in the direction of the columella, which is unusually extended: aperture ovate, broader above. Surface marked by five somewhat unequal striæ, parallel to the aperture, and crossed by finer and less conspicuous revolving striæ.

This species, which seems clearly referable to the Genus PLATYOSTOMA, is remarkable for the attenuation of the last volution and the contraction of the aperture below.

Geological formation and locality. In the Upper Helderberg limestone: Helderberg mountains, and places in Western New-York.

PLATYOSTOMA LICHAS (n. s.).

SHELL obliquely subglobose. Spire moderately elevated: volutions about four, rounded, the earlier ones very gradually expanding, and the last one becoming extremely ventricose; aperture nearly circular. Surface marked by fine striæ of growth.

This species resembles *P. ventricosa* of the Oriskany sandstone; but the spire is more elevated, and the specimens examined do not attain a

size equal to that one. The specimens measure from an inch to one and a half inches in diameter, with a length about one-fifth greater.

Geological formation and locality. In the Upper Helderberg limestone: Clarence Hollow, Stafford, and other places in Western New-York.

EUOMPHALUS CONRADI (n. s.).

Shell discoid. Volutions three or four (rarely preserving more than two or three), gradually enlarging from the apex, which is depressed below the plane of the outer volution : inner volutions rounded above, gradually becoming depressed, and the outer one flattened and sloping towards the ventral side, the upper or dorso-lateral edge obtusely angular; periphery moderately convex, sometimes flattened and gradually contracting to the lower side, which is obtusely angular with the base abruptly depressed, forming a wide umbilicus. Aperture somewhat quadrilateral; a short, nearly straight side against the inner volution; the upper side making a little more than a right angle, while the outer edge makes nearly a right angle with the upper side : the lower side conforms to the upward, bending at the lower outer angle, and, thence following the curve of the umbilicus, is longer than the other sides.

Shell thin. Surface marked by fine elevated striæ of growth, without cancellating striæ.

The fossil has a diameter of two to four inches; but as it usually occurs in the form of casts, the inner volutions are not well preserved : these, at first rounded, gradually become flattened above as they extend from the apex, and the last one slopes from the periphery, giving a concave upper surface. In rare instances, the apex of the spire rises nearly to the plane of the outer volutions.

This species resembles the *Euomphalus disjunctus* of the Lower Helderberg group, but is distinguished by the flattening of the upper side, and the obtuse angles above and below upon the outer volution. It also resembles more nearly the *E. trigonalis* of Goldfuss; but the outer volution is never so much dilated, nor does our shell exhibit the revolving striæ represented in the figure of Goldfuss.

Geological formation and locality. In limestone of the Upper Helderberg group : in numerous localities in Central and Western New-York.

Of the Cephalopoda of the Upper Helderberg group, four species of Cyrtoceras and one Phragmoceras have been described, viz: *C. paradoxum, C. trivolvis, C. matheri, C. undulatum,* and *Phragmoceras spinosum.* Several species of Orthoceratites and Gomphoceras are known, and two of Trochoceras.

TROCHOCERAS CLIO (n.s.).

Shell discoid or depressed, suborbicular, convex above and broadly umbilicate beneath: volutions about three, gradually expanding, the last one becoming ventricose; the outer chamber large. On the lower side of the outer volution, where the diameter is half an inch, the septa have a distance of about one-tenth of an inch; while in the margin of the umbilicus at the same part, they have not more than half this distance, and upon the dorsum about one-eighth of an inch. Siphuncle central.

Surface strongly annulated upon the upper and dorsal portions of the volution, the ridges dying out in the umbilicus: entire surface evenly cancellated by transverse and revolving striæ.

This species attains a diameter of two or three inches, and can be known in its fragmentary condition by the annulated surface.

Geological formation and locality. In the Schoharie grit: Helderberg mountains and Schoharie.

TROCHOCERAS EUGENIUM (n.s.).

Shell subhemispherically discoid: volutions strong, gradually increasing from above to the last one, which becomes more rapidly expanded and ventricose; outer chamber large. Septa, where the shell is one inch in diameter, one-fifth of an inch distant on the lower side, and about half the same distance at the margin of the umbilicus: volutions a little flattened upon the lower side, and abruptly curving into the deep umbilicus. Siphuncle dorsal: dorsal surface of casts showing no annulations; character of shell unknown.

This is a more robust species than the *T. annulatum:* it is readily distinguishable in the absence of annulations, and in the dorsal position of the siphuncle, while the umbilicus is proportionately narrower and deeper.

Geological formation and locality. In the Schoharie grit : Helderberg mountains and Schoharie.

GOMPHOCERAS EXIMIUM (n. s.).

Shell large, the outer chamber gradually contracting from the last septum, and tapering in about the same degree in the opposite direction : section elliptical. The twelve chambers preceding the outer one measure three inches in length; the greatest diameter at the outer section being three and a half inches, and, at the distal section, two and a half inches.

There are about three inches of the outer chamber preserved in the specimen. The entire length of the specimen is more than six inches, the greater diameter about three inches, and the lesser diameter two inches. It may have suffered accidental pressure in some degree; but it is evident, from the prevalent form, that the shell has been originally elliptical in section.

Geological formation and locality. In the Upper Helderberg limestone: Black Rock, New-York.

CORRECTION.

Page 91, for CYCLONEMA VENTRICOSA read Cyclonema varicosa.

Page 92, for *large*, read larger.

CORRECTION FOR THE THIRTEENTH ANNUAL REPORT.

Page 113. In the title of the article for "Hudson-river group," read QUEBEC GROUP.

This correction was made in a part of the edition.

The NOTICE on page 128 did not reach the printer till the form was on the press, and consequently some of the first copies printed are without this notice.

FIFTEENTH ANNUAL REPORT

OF THE

Regents of the University of the State of New-York,

ON THE CONDITION OF THE

STATE CABINET OF NATURAL HISTORY,

AND THE

HISTORICAL AND ANTIQUARIAN COLLECTION ANNEXED THERETO.

Made to the Legislature, April 12, 1862.

ALBANY:
PRINTED BY CHARLES VAN BENTHUYSEN.
1862.

State of New York.

No. 116.

IN SENATE,

April 12, 1862.

FIFTEENTH ANNUAL REPORT

OF THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW-YORK, ON THE CONDITION OF THE STATE CABINET OF NATURAL HISTORY, AND THE HISTORICAL AND ANTIQUARIAN COLLECTION ANNEXED THERETO.

UNIVERSITY OF THE STATE OF NEW-YORK :

OFFICE OF THE REGENTS,
ALBANY, April 12, 1862.

TO HON. ROBERT CAMPBELL,
Lieutenant-Governor and President of the Senate.

SIR :

I HAVE the honor to transmit the Fifteenth Annual Report of the Regents of the University, on the State Cabinet of Natural History, and the historical and antiquarian collection annexed thereto.

I remain, very respectfully,
Your obedient servant,
JOHN V. L. PRUYN,
Chancellor of the University.

REGENTS OF THE UNIVERSITY.

JOHN V. L. PRUYN, LL.D., *Chancellor.*
GULIAN C. VERPLANCK, LL.D., *Vice-Chancellor.*

EX OFFICIO.

EDWIN D. MORGAN, *Governor.*
ROBERT CAMPBELL, *Lieutenant-Governor.*
HORATIO BALLARD, *Secretary of State.*
VICTOR M. RICE, *Superintendent of Public Instruction.*

ERASTUS CORNING.
PROSPER M. WETMORE.
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GIDEON HAWLEY, LL.D.
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Rev. SAMUEL LUCKEY, D.D.
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Rev. ISAAC PARKS, D.D.
LORENZO BURROWS.
ROBERT S. HALE.
ELIAS W. LEAVENWORTH.
J. CARSON BREVOORT.
GEORGE R. PERKINS, LL.D.

S. B. WOOLWORTH, LL.D., *Secretary.*

STANDING COMMITTEE OF THE REGENTS,

SPECIALLY CHARGED WITH THE CARE OF THE STATE CABINET.

1862.

EDWIN D. MORGAN (*Governor*).
HORATIO BALLARD (*Secretary of State*).

Rev. Dr. CAMPBELL,
Mr. CORNING,
Mr. GRAHAM,
Mr. BURROWS,
Mr. LEAVENWORTH.

CURATOR.

EZEKIEL JEWETT.

REPORT.

To the Legislature of the State of New-York.

The Regents of the University respectfully report :

That the collections of the Cabinet have been carefully preserved during the past year : those in Natural History, which are peculiarly liable to ravage and even destruction by insects, are entirely uninjured; a condition to be ascribed principally to the excellent construction of the cases in which they are enclosed.

The Shells from the Smithsonian Institution, referred to in the last Report, have been named, and a full Catalogue is hereto appended.

A generous donation of Freshwater Shells has been received from John G. Anthony, Esq., of Cincinnati, Ohio. These are also catalogued.

The collections in the Palæontology of New-York, occupying the entire second floor of the Hall, are in process of labelling and re-arrangement. This will soon be completed, and will be made as nearly as possible to conform to the natural position of the rocks from which the fossils are taken.

Some additions have been made to the collections in Economic Geology. The enlargement of this department will receive renewed attention during the present year, and the Regents hope to be able hereafter to present a fair exhibition of the natural resources of the State applicable to the various purposes of life.

Some of the results of Prof. Hall's investigations in Palæontology are herewith communicated. These contributions, anticipating the publication of the volumes on this subject in the Natural History of the State, are earnestly sought by those pursuing similar investigations.

The Regents have availed themselves of every opportunity to perpetuate memorials of the Indian nations who inhabited the State of New-York. These nations have gradually faded away, and will soon be known only in the records of history. An unpublished manuscript, being a grammatical and lexicographical treatise on the language of the Mohawks, has been entrusted to the Regents, and is herewith communicated, with a recommendation that it be printed in the appendix to this report.

Respectfully submitted,

By order of the Regents.

JOHN V. L. PRUYN,

Chancellor of the University.

Albany, April 11, 1862.

ACCOUNT CURRENT.

THE Secretary of the Regents of the University, in account current with the appropriation for preserving and increasing the State Cabinet of Natural History,

DR.

1860–61.	To balance to new account (See Assembly Document No. 136, 1861, p. 9),	$388 02
	To amount received from the Comptroller, being the annual appropriation for 1860–61	800 00
	To balance from account of appropriation for altering and repairing the Geological Hall	2 52
		$1190·54

CR.

1860–61.	By cash paid an assistant	$70 00
	.. specimens of natural history	32 00
	.. books	22 00
	.. freight charges	27 33
	.. postage and stationery	25 93
	.. chemicals	33 75
	.. repairs, etc.	43 57
	.. new cases	225 00
		$479 58
	By balance	710 96
		$1190 54

ALBANY CITY BANK : *October* 4, 1861. I certify that there is a balance of seven hundred and ten and $\frac{96}{100}$ dollars, standing to the credit of the State Cabinet of Natural History, on the books of this bank.

(Signed) H. H. MARTIN, *Cashier.*

In behalf of the Standing Committee on the State Cabinet, I have examined the above account, and find it correct. The payments have been made by order of the Standing Committee, and are accompanied with proper vouchers.

E. D. MORGAN, *Chairman.*

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APPENDIX.

(A.)

DONATIONS TO THE STATE CABINET OF NATURAL HISTORY,

From January 1, 1861, to January 1, 1862.

From Dr. ARMSBY.

One Mummy of an IBIS, from the Catacombs of Egypt.
Large GRASSHOPPER, from Africa.

H. B. NORTROP, Esquire, Sandyhill.

One INDIAN RELIQUE : Stone in the form of an egg.

JAMES POWERS, Bath.

One BANDED GARFISH.

WILSON MILLER.

One ECHINUS, West Indies.

SAMUEL L. SMITH, Ireland Corners.

Two RING-SNAKES.

JOHN SMITH, New-York.

Two Bottles of SALT, Saginaw, Michigan.

Hon. GEORGE W. CLINTON, Buffalo.

Six Specimens of BANDED PROTEUS.

J. P. BARNUM, Genoa, Cayuga County.

FOSSILS from the Hamilton group.
INDIAN STONE HAMMER, Genoa.

NOTICE *of a* Mole *not enumerated by* DEKAY *in the Fauna of the State* : BY S. F. BAIRD.

SCALOPS BREWERI, *Bach.* Hairy-tailed Mole.

This species of Mole, although not mentioned by DEKAY in the State Natural History, is in reality very abundantly to be met with in the northern part of the State, and apparently to the exclusion of the more southern species with white naked tail, *S. aquaticus*. Its burrows are very different from those of the latter species; being at a considerable distance beneath the surface, with heaps of loose earth thrown up at intervals over the gallery, without any kind of entrance whatever.

(B.)

CATALOGUE OF SHELLS,

FROM JOHN G. ANTHONY, CINCINNATI, OHIO.

FRESHWATER SHELLS.

UNIO ALASMODONTINUS	Barnes	Ohio.
ALATUS	Say	Ohio.
AMANUS	Lea	
ARGENTEUS	Lea	Tennessee.
BIGBYENSIS	Lea	Tennessee.
BREVIDENS	Lea	Tennessee.
BREVIS	Authors.	
BUCKLEYI	Lea	Florida.
CÆLATUS	Conrad	Tennessee.
CAPAX	Green	Indiana.
CAPOCEFORMIS (male & female),	Lea	Tennessee.
CARDIUM	Rafinesque	Ohio.
CARIOSUS	Say	Pennsylvania.
CHATTANOOGAENSIS	Lea	Alabama.
CICATRICOSUS	Say	Ohio.
COLLINUS	Conrad	Virginia.
COLUMBENSIS	Lea	Georgia.
CONCESTATOR	Lea	Georgia.
CONRADICUS	Lea	Virginia.
CONSTRICTUS	Conrad	Virginia.
CORNUTUS	Barnes	Ohio.
CORROSUS	Villa	Italy.
COSTATUS	Rafinesque	Ohio.
CRASSUS	Say	Ohio.
CUMBERLANDIANUS	Lea	Tennessee.
CUNEATUS	Rafinesque	Ohio.
CUNEOLUS	Lea	Tennessee.
CYLINDRICUS	Say	Ohio.
CYPHIUS	Rafinesque	Esopus Green, O.
DECISUS	Lea	Alabama.
DOLABELLOIDES	Lea	Tennessee.
DOLABRIFORMIS	Lea	Georgia.

UNIO DOWNIEI	Lea	Georgia.
DROMAS	"	Tennessee.
EDGARIANUS	"	Tennessee.
ELLIPSIS	"	Ohio.
EXCAVATUS	"	Alabama.
EXIGUUS	"	Georgia.
FALLAX	"	Georgia.
FASCIOLARIS	Rafinesque	Ohio.
FASCIOLUS	Rafinesque	Ohio.
FATUUS	Lea	Tennessee.
FISHERIANUS	Lea	Maryland.
FLAVUS	Rafinesque	Ohio.
FLEXUOSUS	Rafinesque	Ohio.
FOLLICULATUS	Lea	Virginia.
FOREMANIANUS	Lea	Alabama.
FORSHEYII	Lea	Alabama.
FRAGILIS	Rafinesque	Ohio.
FRAGOSUS	Conrad	Ohio.
FRATERNUS	Lea	Ohio.
GIBBER	Lea	Tennessee.
GIBBOSUS	Barnes	Ohio.
GIBBOSUS (male and female)	Rafinesque	Ohio.
GLANS	Lea	Indiana.
GLOBULUS	Say	Louisiana.
HALLENBECKII	Lea	Georgia.
HANLEYANUS	Lea	Alabama.
HAYSIANUS	Lea	Tennessee.
HEROS	Say	Ohio.
HETERODON	Lea	New-York.
HETERODON	Lea	Massachusetts.
HOPETINENSIS	Lea	Georgia.
HYDIANUS	Lea	Louisiana.
INCRASSATUS	Lea	Georgia.
INFUCATUS	Conrad	Georgia.
INTERCEDENS	Lea	Georgia.
INTERMEDIUS	Conrad	Tennessee.
INTERRUPTUS	Rafinesque	Tennessee.
IRRORATUS	Lea	Ohio.
JEJUNUS	Lea	Virginia.
KLEINIANUS	Lea	Georgia.
LAPILLUS	Say	Ohio.
LANCEOLATUS	Lea	Virginia.
LEPTODON	Rafinesque	Ohio.
LINDSLEYI	Lea	Tennessee.
LUGUBRIS	Lea	Georgia.
MARGINATUS	Lamarck	East Indies.

UNIO METANEVER	Rafinesque	Ohio.
MONODONTUS	Say	Tennessee.
NASHVILLIANUS	Lea	Ohio.
NASUTUS (male and female)	Say	Ohio.
NERVOSUS	Rafinesque	Ohio.
NEXUS	Say	Tennessee.
NIGER	Rafinesque	Ohio.
NITENS	Lea	Tennessee.
NOVÆBORACI	Lea	Michigan.
OBESUS	Lea	Georgia.
OBOVATUS	Rafinesque	Ohio.
OBTUSUS	Lea	Georgia.
OHIOENSIS	Rafinesque	Ohio.
ORBICULATUS (male & female)	Hildreth	
OVATUS	Say	Ohio.
PARVUS	Barnes	Ohio.
PAULUS	Lea	Georgia.
PELLUCIDUS	Lea	Ohio.
PERCOARCTATUS	Lea	North-Carolina.
PERDIX	Lea	Tennessee.
PERNODOSUS	Lea	Alabama.
PERPLICATUS	Conrad	Alabama.
PILEUS	Lea	Ohio.
PLEXUS	Conrad	Mexico.
PLICATUS	Say	Ohio.
POLITUS	Say	Ohio.
PRASINUS	Conrad	Michigan.
PROXIMUS	Lea	Tennessee.
PULLATUS	Lea	Georgia.
PURPUREUS	Say	Maryland.
PUSTULATUS	Lea	Ohio.
PUSTULOSUS	Lea	Ohio.
PYRAMIDATUS	Lea	Ohio.
QUADRULUS	Rafinesque	Ohio.
RADIATUS	Gmelin	New-York.
RANGIANUS (male and female)	Lea	Ohio.
RECTA	Anthony	
RECTUS	Lamarck	Ohio.
RUBER	Rafinesque	Ohio.
SAYII	Tappan	Ohio.
SECURIFORMIS	Conrad	Georgia.
SECURIS	Lea	Ohio.
SHEPARDIANUS	Lea	Georgia.
SILIQUOIDEUS	Barnes	Ohio.
SINUS	Lea	Tennessee.

Unio sowerbyanus	Lea	Tennessee.
sparsus	Lea	Tennessee.
spatulatus	Lea	Michigan.
spissus	Lea	
splendidus	Lea	Georgia.
stewardsonii	Lea	Tennessee.
stramineus	Conrad	Alabama.
striatus	Rafinesque	Ohio.
subangulatus	Lea	Georgia.
subgibbosus	Lea	Alabama.
subplanus	Conrad	Virginia.
subrostratus	Say	Ohio.
subtentus	Say	Tennessee.
sulcatus	Lea	Ohio.
tæniatus	Conrad	Tennessee.
tarsus	Rafinesque	Ohio.
teres	Rafinesque	Ohio.
trapezoides	Lea	Louisiana.
tortuosus	Lea	Georgia.
triangularis	Barnes	Ohio.
trigonus	Lea	Ohio.
troostiensis	Lea	Tennessee.
truncatus	Rafinesque	Ohio.
tuberculatus	Rafinesque	Ohio.
turgidulus	Lea	Tennessee.
turgidus	Lea	Mississippi.
undatus	Barnes	Ohio.
vanuxemenianus	Lea	Tennessee.
verecundus	Gould	East Indies.
verrucosa	Reeve	
verrucosus	Rafinesque	Ohio.
viridis	Rafinesque	North-Carolina.
Alasmodon ambigua	Say	Ohio.
bonellii	Ferussac	Europe.
calceola	Lea	Ohio.
complanata	Barnes	Ohio.
costata	Rafinesque	Ohio.
deltoidea	Lea	Ohio.
edentula	Say	Ohio.
elliotti	Lea	Georgia.
etowahensis	Conrad	Georgia.
fabula	Lea	Virginia.
impressa	Anthony	
marginata	Say	North-Carolina.
triangulata	Lea	Georgia.
truncata	Say	Ohio.
undulata	Say	Maryland.

ANODON GIBBOSA	Say	Georgia.
GRANDIS	Say	Ohio.
IMBECILLIS	Say	Ohio.
LATA	Rafinesque	Ohio.
MODESTA	Lea	Michigan.
MORTONIANA	Lea	South America.
PALLIDA	Authors	Michigan.
SHAFERIANA	Lea	Michigan.
AMPULLARIA DEPRESSA	Say	Georgia.
ANCULOSA CANALIFERA	Authors	North-Carolina.
CORPULENTA	Authors	North-Carolina.
ELEGANS	Authors	Alabama.
GENICULA	Haldeman	Tennessee.
GIBBOSA	Lea	Tennessee.
GRIFFITHIANA	Lea	
KIRTLANDINA	Authors	Virginia.
ORNATA	Authors.	
PATULA	Authors	Tennessee.
RUBIGINOSA	Lea	
SUBGLOBOSA	Say	Tennessee.
TÆNIATA	Conrad	
GLANDINA TRUNCATA	Say	Florida.
LIMNEA APPRESSA	Say	Michigan.
PIRENA FLUMINEA	Gmelin	
TEREBRALIS	Lamarck	
LITHASIA SHAWALTERI	Lea	
SOLIDA	Lea	
IO BREVIS	Authors	Tennessee.
FUSIFORMIS	Lea	Tennessee.
INERMIS	Authors	Tennessee.
SPINOSA	Lea	Tennessee.
PALUDINA MAGNIFICA	Conrad	Alabama.
PONDEROSA	Say	
SUBPURPUREA	Say	
MELANIA ACULEUS	Lea	
ADUSTA	Authors	Tennessee.
ALBESCENS	Lea	
ANGUSTISPIRA	Authors	Tennessee.
ANNULIFERA	Conrad	Alabama.
ARACHNOIDEA	Authors	Tennessee.
ASPERA	Lamarck	
ATHLETA	Authors.	
ATRA	Richard	

MELANIA BICOSTATA	Authors	Tennessee.
BICINCTA	Authors	Tennessee.
CANALICULATA	Say	Tennessee.
CANALIS	Lea	
CASTANEA	Lea	Tennessee.
CATENOIDES	Lea	Georgia.
CHOCOLATUM	Brot	
COLLISTRICTA	Reeve	
CONSANGUINEA	Authors	Indiana.
COSBELLARIS	Lea	
CREBRISTRIATA	Lea	
CYLINDRACEA	Conrad	Alabama.
DACTYLUS	Lea	
DECORATA	Authors.	
EBURNUM	Lea	Tennessee.
EDGARIANA	Lea	Tennessee.
EPISCOPALIS	Lea	
FLORENTINA	Lea	Tennessee.
FOREMANIANA	Lea	
FULGIDA	Reeve	
FUNEBRALIS	Authors	Tennessee.
GLABRA	Lea	Tennessee.
GLANS	V. D. B.	
GRATA	Authors.	
HALLEBECKII	Lea	Georgia.
HASTULA	Lea	
HYBRIDA	Authors	Tennessee.
HYDEI	Conrad	Alabama.
IMBRICATA	Authors	Georgia.
INFRAFASCI	Authors	Tennessee.
INTERTEXTA	Authors	Tennessee.
IOSTOMA	Authors	Tennessee.
JAYANA	Lea	Tennessee.
LANCEA	Lea	
LATERITIA	Lea	
LŒIRRINEA		
NEGLECTA	Authors	Ohio.
NIAGARENSIS	Lea	Niagara Falls.
NICKLINIANA	Lea	Virginia.
NUPERA	Say	Indiana.
OLIVULA	Conrad	Alabama.
PAGODIFORMIS	Authors	Tennessee.
PALLESCENS	Lea	
PAUCICOSTA	Authors	Tennessee.
PERNODOSA	Lea	Tennessee.
PINGUIS	Lea	Tennessee.

MELANIA PLANOSPIRA	Authors	Kentucky.
PROSCISSA	Authors	North-Carolina.
PULCHERRIMA	Authors	North-Carolina.
PYRENELLA	Conrad	Alabama.
RHOMBICA	Authors	Tennessee.
RIGIDA	Authors	Tennessee.
SETOSA	Swainson	
SIMPLEX	Say	Virginia.
SPUREA	Lea	Tennessee.
SYMMETRICA	Haldeman	Virginia.
TENEBROCINCTA	Authors	Tennessee.
TENEBROSA	Lea	Tennessee.
TORULOSA	Authors	Tennessee.
UNCIALIS	Haldeman	Tennessee.
VALIDA	Authors	Tennessee.
VANUXEMENIANA	Lea	
VESTITA	Conrad	Alabama.
VIRIDULA	Authors	Tennessee.
VITTATA	Authors	Georgia.
WARDERIANA	Lea	Virginia.

(C.)

CATALOGUE OF SHELLS,

CONTRIBUTED FROM THE DUPLICATES COLLECTED BY THE EXPLORING EXPEDITION,

BY PROF. HENRY, OF THE SMITHSONIAN INSTITUTION.

Ancillaria glandina
Arca granosa
Arca holoserica
Argonauta argo
Argonauta tuberculosa
Aspergillum javanum
Auricula midæ
Bathisa tenebrosa
Bulimus daphnis
Bulimus faunus
" fulguratus
" maleatus
" ovatus
" smaragdus
" viridostriatus
" woodianus
Bulimus, 4 sp. ind.
Bulla ampulla
Cardium alternatum
Cardium cardissa
" elongatum
" unedo
Cassis cornutum
Cassis erinaceus
" madagascariensis
" rufa
" viber
Cerithium adansoni
Cerithium aluco
" lineatus
" nodulosum
" obeliscum
" obtusa
" telescopium
" vertagus
Chama, ind.
Concholepas peruviana
Conus arenatus
Conus aulicus
" betulinus
" daucus
" eburneus
" emaciatus
" episcopus
" figulinus
" flavidus
" generalis
" geographicus
" hebræus
" imperialis
" marmoreus
" miles
" millepunctatus
" mustelinus
" pulicarius
" quercinus
" striatus
" terebra
" tesselatus
" textilis
" tulipa
" vexillum
" virgo
Corbis fimbriata
Cyprea achatina
Cyprea annulus
" arabica
" arenosa
" argus
" aurantia
" canrica
" caput-serpentis
" carneola
" eburnea

Cyprea erosa
" histrio
" isabella
" lynx
" madagascariensis
" mappa
" mauritiana
" moneta
" obvelata
" scurra
" talpa
" tesselata
" testudinaria
" tigris
" vitellus
Delphinula laciniata
Dolium galea
Dolium olearium
" perdix
" pomum
Fasciolaria filamentosa
Fissurella erratica
Fusus tuberculatus
Haliotis asininus
Haliotis chracherodi
" iris
" ovina
" pulcherrima
" rufescens
Harpus minor
Harpus nobilis
Harpus ventricosa
Helix hemastoma
Helix lamarckii
" rhea
" roissiana
Helix, sp. ind.
Littorina coronaria
Lucina exasperata
Lutraria capax
Mactra braziliana
Malleus albus
Malleus anatinus
Malleus vulgaris
Margaritiphora margaritifera
Mitra episcopalis
Monoceras crassilabrum
Monoceras imbricatum
Monodonta, sp. ind.
Murex adusta
Murex brandaris
" elongatus
" inflatus
" rubiginosus
" ternispina
" trigonulus
Mytilus californiensis
Mytilus chronos
" edulis
" smaragdus
Nassa arcularia
Natica mammillaris
Natica maroccana
Natica melanostoma
Natica, sp. ind.
Nautilus pompilius
Nautilus umbilicatus
Nerita albicella
Nerita polita
Neritina granosa
Oliva auricularia
Oliva carneola
" episcopalis
" erythrostoma
" gibbosa
" guttata
" maura
" olympiada
" sanguinolenta
Oliva, 2 sp. ind.
Ostrea cristata
Ovulum ovum
Ovulum verrucosum
Pecten dislocatus
Pecten pleuronectes
Pecten sinensis
Pinna flabellum
Pinna nigra
Pinna, sp. ind.
Placuna sella
Pteroceras byronia
Pteroceras chiragra
" lambis
" scorpio
Pteroceras (young).
Pteroperna, sp. ind.
Purpura aperta
Purpura armigera
" chocolata
" hippocastanum
" melones
" patula
" persica
" pica
Purpura (Pisania) sertum
Purpura, 2 sp. ind.
Pyrula ventricosa
Ranella bufonia
Ranella ventricosa
Ricinula arachnoides
Ricinula horrida
Sanguinolaria rugosa

Scarabus castaneus
Scarabus lessoni
" pollex
" striatus
Solarium perspectivum
Spondylus giganteus
Spondylus, 2 sp. ind.
Strombylus auris-dianæ
Strombylus canarium
" epidromis
" flavidus
" gibberulus
" isabella
" latissimus
" lentiginosus
" luhnanus
" plicatus
" succinctus
" urceus
" vittatus
Struthiolaria nodulosa
Tapes, sp. ind.
Tellina remies
Tellina scobinata
Terebra crenulata
Terebra dimidiata
" maculata
" oculata
" strigata
" subulata
Triton anus
Triton chlorostoma
" lampas
" lineatus
" pilearis
" rudis
" tuberosus
" variegatus
Trochus acutus
Trochus cælatus
" georgianus
" granosus
" intextus
" maculatus
" marmoreus
" niloticus
" obeliscus
" tubiferus
Turbo argyrostoma
Turbo ater
" chrysostoma
" cookii
" crassus
" lajonkairii
" margaritaceus
" petiolatus
" porphyrites
" pulcher
" radiatus
" rugosus
" saxosus
" smaragdus
" sparverius
" tesselatus
" versicolor
Turritella duplicata
Venus crebrisulca
Venus geographica
" petitii
" picta
" virginea
Venus, 5 sp. ind.
Vermetus, sp. ind.
Voluta ancilla
Voluta ethiopica
" tuberculata
" vespertilio

(D.)

CONTRIBUTIONS TO PALÆONTOLOGY;

COMPRISING

DESCRIPTIONS OF NEW SPECIES OF FOSSILS,

FROM THE

Upper Helderberg, Hamilton and Chemung Groups.

BY JAMES HALL.

*** THE descriptions of the following species of fossils, from page 29 to page 112, were printed and published in advance of this Report, and at the dates indicated at the bottom of the pages.

GASTEROPODA.

GENUS PLATYCERAS (CONRAD).

PLATYCERAS (ORTHONYCHIA) DENTALIUM (n. s.).

SHELL slender, elongate, subspiral, making about half of one volution in the length of one and a half inches, somewhat flattened obliquely from the base to near the apex : section subelliptical, giving the diameters about as two to three. The middle of the flattened sides are often a little concave, rounded towards the apex, which is minute and abruptly incurved.

SURFACE marked by transverse or concentric striæ of growth, and by longitudinal sulci which are conspicuous on the lower part of the shell, and give to the transverse striæ a strongly undulated character. Aperture oblique.

In a specimen one inch and a half in length, the greatest diameter is less than half an inch.

This species is much more slender and less distinctly spiral than the *P tortuosus* of the Oriskany sandstone, and differs in the same features more extremely from any of the species known in the Lower Helderberg group.

Geological formation and locality. In the limestone of the Upper Helderberg group : near Williamsville and Buffalo, N.Y.

PLATYCERAS (ORTHONYCHIA) SUBRECTUM.

ORTHONYCHIA (genus proposed) : Report Fourth District New-York Geological Survey, pag. 172, no. 68, f. 3.

PLATYCERAS SUBRECTUM. Twelfth Annual Report of the Regents on the State Cabinet, p. 18.

SHELL unguiform, elongate, subspiral, making not more than a quarter of a volution in the length of three-fourths of an inch, below which it is entirely straight. Apex minute, abruptly incurved, solid, nearly cylindrical for a short distance below the apex and gradually compressed, becoming a little concave on the posterior side : aperture somewhat oblique.

SURFACE marked by concentric striæ, which are sometimes crowded together, forming ridges or wrinkles.

This species is more robust and rapidly expanding than the *P. dentalium*, and is more enrolled at the apex ; but it does not show the longitudinal sulci and ridges which are characteristic of *P. dentalium*.

ALBANY, N.Y.] [August 1861.

This is the species figured in the Report of the Fourth Geological District, and the form typical of those for which I proposed the generic name ORTHONYCHIA. The apex or nucleus of this and of other species is usually solid, and, when the shell is removed, the casts show a rounded obtuse apex which is sometimes scarcely incurved.

Geological formation and locality. In the limestone of the Upper Helderberg group : near Buffalo and Williamsville, N.Y.

PLATYCERAS ATTENUATUM (n. s.)

SHELL elongato-ovate or conically subovate, with a slender apex which makes about a single volution, and below which the body-whorl becomes rather abruptly inflated, and thence gradually expands to the aperture, which is very oblique; the anterior side of the peristome being much more extended.

SURFACE marked by crowded undulating concentric striæ and longitudinal irregular and undefined folds, which vary greatly in different specimens : these become more distinctly marked as plications near the aperture. Peristome sinuous, with numerous indentations corresponding to the folds upon the surface.

In many specimens the surface is marked by abruptly undulating plications without distinct folds, or with the folds obscurely developed. Length of shell about one inch, with the greatest diameter a little less than half an inch.

This species is distinguished by the abrupt contraction of the upper part of the shell of the body-whorl, or just below the curvature ; while the apex, consisting of a single minute volution, is abruptly contracted, and proportionally more slender than in most other species. It somewhat resembles the *P. clavatum* of the Lower Helderberg group.

Geological formation and locality. In the shales of the Hamilton group on the shores of Seneca and Cayuga lakes, Geneseo, Moscow, and other places in Western New-York.

PLATYCERAS (ORTHONYCHIA) CONCAVUM (n. s.).

SHELL robust, subspiral, slender, gradually expanding above and more rapidly dilating towards the aperture, which is subquadrilateral, with the peristome strongly undulated.

The specimen is imperfect at the apex, and the lower portion makes less than half a turn from the aperture in the length of about two inches : apex unknown. Anterior side of the body-volution convex and ventricose : posterior side distinctly concave; the right side moderately convex, and the left side rounded. Surface marked by concentric undulating striæ.

The length of the fragment is two inches; the aperture, from the posterior to the anterior side, is about seven-eighths of an inch, and the transverse diameter a little more than one inch.

This species resembles the *P. tortuosum* of the Oriskany sandstone, but is more robust and more rapidly expanding towards the aperture, which is much less oblique than in that species, while the concave posterior and prominent anterior side are distinguishing features.

Geological formation and locality. In the limestone of the Upper Helderberg group : Williamsville, Erie county, N.Y.

PLATYCERAS CONICUM (n. s.).

Shell erect, conical, the minute apex closely incurved? Body-volution entirely straight, with broad undefined longitudinal ridges and depressions, which become more distinct towards the aperture : height of the shell a little greater than the width of aperture, which is a little longer than wide. Surface marked by concentric undulating striæ which become sublamellose towards the aperture, and are sometimes closely crowded and wrinkled with numerous knots or nodes. Peristome deeply sinuous; the width from the anterior to the posterior side a little greater than the transverse diameter.

The length of the shell is one and a half inches or more, with the aperture a little less.

This species approaches the *P. pyramidatum* of the Lower Helderberg group, but is less elongate, the peristome is more sinuous, and the indication of longitudinal ridges and depressions is more distinct : the crowded wrinkled and nodose striæ are likewise a distinctive feature.

Geological formation and locality. In the Hamilton group, Ontario county; and in the Upper Helderberg limestone at Darien and Williamsville, N.Y.

PLATYCERAS THETIS (n. s.).

Shell obliquely arcuate from the base, with the apex incurved, and making scarcely a single minute volution; gradually expanding from the apex to near the aperture, which is sometimes more abruptly spreading. The back of the body-whorl is prominent, and a little flattened on the left side; while the right side, from one-third to one-half the length, is sometimes marked by two or three longitudinal folds. Aperture a little oblique, nearly round or approaching to quadrangular, with the peristome sinuous.

Surface marked by fine closely arranged lamellose striæ, which are abruptly undulated on all parts of the body of the shell.

In many, and perhaps nearly all specimens, the body of the shell, along a line a little to the left of the dorsum, is marked by an abrupt curvature of the striæ, indicating a notch in the margin of the peristome. This line is sometimes marked by a narrow prominent band, not unlike the band in Pleurotomaria.

This species differs from *P. attenuatum*, in being arcuate from the base, in the gradual attenuation towards the apex, and the more closely incurved nucleus.

Geological formation and locality. In shales of the Hamilton group: at Moscow, York, and Ontario county; and in limestone of the Upper Helderberg group, Albany county, N.Y.

PLATYCERAS ERECTUM.

Acroculia erecta: Geol. Report 4th District New-York, p. 174, and fig. 6, p. 172.

This species, originally described from specimens in the Corniferous limestone, occurs also in the Hamilton group. The spire at the apex is closely enrolled for about one and a half volutions, beyond which the body-volution becomes somewhat rapidly expanded, with the aperture often spreading. The specimens are often more arcuate than the figure in the Geological Report, and the aperture oblique, with the peristome sinuate. The surface is marked by closely arranged revolving lamellose striæ, which, upon the lower half of the body-volution, are abruptly arched along narrow bands corresponding with former sinuosities of the aperture.

Geological formation and locality. In the limestone of the Upper Helderberg group, Williamsville and near Buffalo; and in the Hamilton group, at York, Moscow, Darien, and other places.

[August,

PLATYCERAS CARINATUM (n. s.).

SHELL obliquely subconical or subpyramidal; the nucleus or apex minute, and making from one to one and a half volutions which are vertically compressed, and below which the body-volution is abruptly expanded; the dorsum angular, or marked by an angular carina which often becomes double in old shells, or is rounded on the summit. This angularity or carina indicates the existence of a notch or sinus in the peristome; and sometimes there may have been two such sinuosities close together, giving the double carina. There is usually a depression along one or both sides of the carina, with longitudinal folds on one or both sides, which become more strongly developed towards the aperture, and are very conspicuous in old shells: the right side is more expanded than the left, and in some well-preserved specimens is nearly twice as wide. Aperture very oblique and subtriangular, and the peristome sinuous.

SURFACE marked by fine closely arranged undulating striæ of growth, which are not lamellose.

This species is very well marked in its dorsal carina and rapidly expanding body-volution, which spreads always more on the right side. The surface, though striated, is close, and the shell compact; differing in this respect from most of the other species. Having examined more than a dozen individuals, from the length of less than half an inch to that of an inch and a half, the characters mentioned are preserved in a marked degree in all of them. In the largest specimens, the aperture is a little more than an inch in its greatest diameter, and nearly equal to the height of the shell.

Geological formation and locality. In limestones of the Upper Helderberg group: Helderberg mountains and Williamsville, N.Y., and Sandusky, Ohio; in the Hamilton group, at Eighteen-mile creek, Darien, Pavilion, Canandaigua and Seneca lakes.

PLATYCERAS BUCCULENTUM (n. s.).

SHELL ventricose, obliquely subovoid: apex extremely attenuate, making one to two closely enrolled volutions, with a gently expanding diameter, and below this more abruptly expanding and becoming very ventricose in the middle and below, spreading

more upon the right side than upon the left, and the peristome near the posterior side swelling out into a distinct pouch-like projection, with two or three rounded folds or semiplications which give a deeply sinuous outline to the margin. Aperture subovate, and sinuate on the right posterior side. Peristome slightly sinuous, and spreading on the posterior side partially over the preceding volution.

SURFACE marked by fine closely arranged concentric striæ, undulated towards the margin of the aperture; with obsolete revolving bands or lines, giving a waved aspect to the surface.

This species is more ventricose than any of those described in this paper. The character of apex, and the widely expanded body-volution, resemble in some degree the *P. ventricosum* of the Lower Helderberg ; but the first volution is more slender and the spire less elevated, while the lateral pouch-like expansion is a distinctive feature. This shell is also much smaller, rarely more than an inch high, while the greatest diameter of the aperture is about equal to the height.

Geological formation and locality. In shales of the Hamilton group at York and Moscow, Livingston county, N.Y.

PLATYCERAS SYMMETRICUM (n. s.).

SHELL elongate, subovoid, arcuate, incurved nearly in the same plane, the apex making about a single volution, below which the shell is somewhat abruptly expanded : expansion about equal on the two sides of the dorsum, which is more prominent and sometimes marked by a ridge. Aperture very oblique : margin of the peristome sinuate, and, on the posterior side, distant from the spire.

SURFACE marked by concentric undulating striæ, and longitudinally by obscure interrupted ridges, which, on some parts of the older shells, become regular and uniform with a narrow groove between.

This species is well marked by the equilateral expansion on each side of the dorsum, and by the volution of the apex being nearly in the same plane. The longitudinal ridges are more strongly marked, and of a different character from those of *P. bucculentum.*

Geological formation and locality. In the Upper Helderberg limestone at Darien, and in the Hamilton group at Darien, York, and Canandaigua lake.

PLATYCERAS RICTUM (n. s.).

Shell very depressed and obliquely subconical, the width equalling or exceeding the height. Apex minute and enrolled to about one and a half turns, when it abruptly expands, spreading more upon the right posterior side and becoming elongated in front, giving a peculiar oblique form to the shell. Aperture obliquely ovate : peristome entire, or with a slight sinuosity on the left posterior side; posterior side not contiguous to the preceding volutions.

Surface marked by fine undulating concentric striæ : a few broad undulations mark the surface longitudinally. Width of aperture about an inch and a quarter, and a little greater from the anterior to the posterior margin : height about an inch.

This species is very expanded, with surface striæ differing from any of the preceding.

Geological formation and locality. In shales of the Hamilton group : Ontario county, N.Y.

PLATYCERAS CYMBIUM (n. s.).

Shell subangularly ovoid. Apex minute, making one or more turns, below which the shell is abruptly expanded; the back flattened or but moderately convex, while the right side is distinctly flattened, making an obtusely angular ridge between the side and back of the shell, and sloping more gently on the left side. Aperture extremely spreading.

Surface marked by transverse striæ, which are undulated on the dorso-lateral angle. Shell lamellose striate, with a few strong nodes or spines : these, in the specimens examined, are broken so that their extent is unknown.

This species is characterized by the broad expansion of the aperture, the flattened dorsum and right or upper side, giving an obtuse dorso-lateral angle.

Geological formation and locality. In Upper Helderberg limestone, at Clarence-hollow, N.Y.

PLATYCERAS FORNICATUM (n. s.).

Shell obliquely subhemispherical, or very depressed obliquely conical. Apex minute, distinctly spirally enrolled for about one turn and a half, below which it expands, so that in the extent of an inch and a half along the dorsum to the front it has acquired

an aperture of about an inch and a half in diameter in both directions; the peristome having a little projection in the postero-lateral margin. The upper side of the spire, for the first one and a half volutions, is flattened; the angle continuing into the broad expansion of the body-whorl, and dying out before reaching the margin. Aperture nearly round or round-ovate : peristome scarcely sinuous.

SURFACE marked by fine concentric striæ, with a few strong spines upon the body-volution.

This species is conspicuously different from the *P. dumosum*, in the shorter and comparatively more expanded form; while the few scattered spines appear to be without order on the surface. A variety, which may belong to this species, has a less expansion of aperture, an obliquely ovoid form, less attenuate apex, and greater proportionate height.

Geological formation and locality. In limestone of the Upper Helderberg group : Williamsville, and near Carlisle. The varieties are from Darien, N.Y.

PLATYCERAS CRASSUM (n. s.).

SHELL large, irregular, obliquely subovate, arcuate, somewhat broadly flattened on the back, with several more or less strongly defined longitudinal folds, strongly incurved at the summit, the apex making one or two volutions : the body-whorl spreads more on the right side, while the left posterior side is often flattened or depressed, with a greater expansion or sinuosity immediately behind. Aperture very oblique, subquadrangular or irregularly rounded, with a deep sinus on the right anterior margin; the peristome sinuous.

SURFACE marked by concentric undulating lamellose striæ : shell thick, raised at unequal intervals into nodes and interrupted ridges.

The length of large specimens is two and a half inches, and height a little less than two inches; while the transverse diameter of the aperture is from one and a half to two inches, and the longitudinal diameter a little less.

This shell is remarkable for its great strength and thickness : it is more oblique than the *P. rarispinum*, and expands less rapidly, while the fold or carina near the summit is on the left side.

Geological formation and locality. In the Upper Helderberg limestone : Helderberg mountains, Albany and Schoharie counties.

PLATYCERAS AMMON (n. s.).

Shell depressed, suborbicular, making about two volutions, with the summit of the spire on the same plane or a little above the plane of the outer volution. Spire small : volutions contiguous throughout their whole extent, very gradually expanding; the last half of the body-whorl ventricose. Aperture large, subovate, deeply sinuate on the left anterior margin.

Surface marked by fine concentric undulating striæ, which are deeply arcuate on the back of the last volution, corresponding to the sinuosity of the aperture; the striæ aggregated in folds or ridges, giving an irregular or undulating surface to the shell.

This species has the form of Platyostoma; but the peristome shows no columella, and presents a wide umbilicus. The length of the largest specimen, from the outer margin of the aperture to the opposite side of the volution, is more than three inches : the longitudinal diameter of the aperture is nearly two inches ; the width, a little less.

Geological formation and locality. In the Corniferous limestone : Darien, N.Y. I have also seen the same from Port Colborne, Canada West.

PLATYCERAS DUMOSUM (Conrad).

P. dumosum : Conrad, Ann. Rep. on the Palæontology of New-York, 1840, p. 205.

This shell, in its full size, attains a length of two and a half inches, with the entire surface covered with strong spines sometimes two inches in length. In well-marked specimens these spines are arranged in diagonal rows across the body of the shell, and show a nearly regular quincunx order. One specimen shows the bases of ninety of these spines, and, from the extent of the shell, the whole number must have been more than one hundred.

Mr. Conrad's description is as follows : "Shell covered with thick tu-"bular spines, arranged in longitudinal rows ; margin of aperture waved ; "volutions free." He remarks that "in some varieties the spines are comparatively few." In some specimens of more than half the full size, there are not more than fifteen or twenty spines ; and in all those with few spines, the expansion of the body-whorl is much less abrupt, while they rarely attain more than half the size of the large typical forms. The number of volutions in the smaller forms is fully equal to the larger ones ; being two or more, with the last one quite free.

Since this form is so distinct and constant, I propose to designate it as a variety.

PLATYCERAS DUMOSUM, *var.* RARISPINUM.

SHELL consisting of about two volutions; the apex closely enrolled for more than one volution, and sometimes the volutions are contiguous nearly to the aperture : for one and a half volutions the apex is slender and gently expanding, the body-volution expanding more rapidly below and becoming moderately ventricose, depressed on the dorsum. Aperture somewhat round-oval.

SURFACE marked by wrinkled concentric striæ, which are strongly undulated at the bases of the spines. Spines scattered, comparatively strong, from five to fifteen or seventeen on shells from the medium to the largest size.

The larger shells have a length of less than two inches, with a height of one and a half inches; the greatest diameter, one inch and a quarter.

This shell is never so ventricose as the *P. dumosum* proper, and the dorsum is flattened, while in that it is always convex. The *P. dumosum* is a rare shell, while the smaller variety is not uncommon.

Geological formation and locality. In limestone of the Upper Helderberg group : Helderberg mountains, and in Oneida, Onondaga and Erie counties, N.Y.; Canada West; Ohio, and Falls of the Ohio river.

The *P. dumosum* cited by Mr. CONRAD as occurring in the Hamilton group, is a variety of more ventricose form than the one here described, and has fewer spines. For this I propose the name *Platyceras sparsum.*

PLATYCERAS ECHINATUM (n. s.).

SHELL small, obliquely subovoid. Apex closely incurved for about one volution; the body-whorl, from one-half to one volution, is ventricose, rapidly expanding from the first volution, giving an obliquely conical form. Aperture nearly circular or round-oval : peristome sinuate, the lines of growth and fine striæ conforming in direction to the outline of the margin. Remains of revolving striæ are sometimes preserved, where the shell is not exfoliated. Besides the concentric and less conspicuous revolving striæ, the surface is studded with numerous strong nodes or spines; the latter preserved only when the shell is imbedded in soft shale, and quite separable from the rock : when imbedded in limestone, the spines and exterior are exfoliated with the matrix.

In this species the shell varies from half an inch to an inch and a quarter; and in a large specimen, the greatest diameter of aperture is one inch.

Geological formation and locality. In shales of the Hamilton group: Moscow and Ludlowville; and in Tully limestone? at Ovid, N.Y.

PLATYCERAS ARGO (n. s.).

SHELL varying from subdiscoid to obliquely subovoid, with body-whorl extremely ventricose: nucleus minute, with the apex closely enrolled for about two volutions, beyond which it expands more or less abruptly; the last volution nearly or quite in contact with the preceding one. The body of the shell is often obtusely triangular, becoming rounded towards the aperture, and sometimes for nearly half the length of the body-whorl. Aperture round or round-ovate, sometimes approaching to quadrangular, broadly sinuate on the right side and deeply sinuate on the left side, where the peristome is sometimes strongly reflexed, forming an apparent columellar lip.

STRUCTURE of the shell lamellose, as in the CEPHALOPODA, with a nacreous lustre; the exterior surface marked by fine revolving striæ, with distant stronger striæ or ridges, and cancellated by coarse concentric undulating striæ which are bent backwards upon the somewhat regular ridges, presenting several bands similar to the single one in PLEUROTOMARIA.

This species is remarkable for the peculiar lamellose structure throughout, presented on fracture or exfoliation, and which gives it the character of a NAUTILUS or BACULITES of the Secondary rocks. When the apex remains covered, it might be mistaken for a reversed shell; the depression on the upper side of the spire being deeper and more abrupt than on the lower side, as the plane of the first volutions is below the centre of the shell, and the spire is shown only in the first or first and second volutions.

Geological formation and locality. In the Upper Helderberg limestones: Williamsville, Erie county, N.Y.

GENUS PLATYOSTOMA (CONRAD, 1842).

See Twelfth Annual Report of the Regents on the State Cabinet of Natural History, p. 20.

PLATYOSTOMA LINEATA.

Platyostoma lineata [?] : Conrad, Jour. Acad. Nat. Sciences, Vol. viii, pa. 275, pl. 17, f. 7.

"Transversely subovate, with wrinkled reticulated striæ : aperture
"orbicular; spire depressed, or slightly elevated above the top
"of the body-whorl."

Although no geological position is assigned to this species, and the figure does not correspond with the greater part of the specimens examined, I am still inclined to regard this as the common form of the Hamilton group, of which I have seen at least two hundred individuals.

The form is subovate, approaching to subglobose : the spire is always elevated above the body-whorl, though varying in degree. The shell consists of four or five volutions when entire; but it rarely happens that more than three are preserved, the apex usually being imperfect. The outer volution is very ventricose and regularly convex, a little depressed (but not canaliculate) below the suture line : aperture orbicular in perfect specimens; outer lip thin, with a sharp entire margin; columellar lip thickened, folded, and reflexed over the umbilicus, which, in adult specimens, is entirely closed. Surface marked by fine, nearly equidistant, thread-like, revolving striæ, which are cancellated by fine concentric striæ of about the same strength, but unequally distant. Sometimes the striæ are bent abruptly backwards upon the back of the shell. In well-preserved specimens, the surface is beautifully cancellated; and in the worn and partially exfoliated specimens, some remains of these surface markings are usually visible.

This species approaches in surface characters the *P. turbinata* of the Schoharie grit and Helderberg limestone; but the spire is never so depressed, and the aperture never so straight above, nor so extended on the lower side. It has usually a length of one to two inches. A well-formed individual measures one and a half inches long, with a vertical height of about one inch : another specimen, preserving its proportions free from compression, has a length of two inches, with a vertical height from base of aperture to apex of less than one and a half inches. A single extravagant specimen has a length of three inches, with a width of aperture of nearly two inches; the body volution, for a distance of two inches from the aperture, is more than usually straight, and marked by crowded and unequal concentric striæ without revolving striæ, while these are preserved on the upper part of the shell. A cast of a specimen in the Corniferous limestone from Batavia has a length of more than three inches, while the vertical diameter of the aperture does not exceed one inch and a half; and the specimen bears no evidence of compression. The specimens which I have seen from Ohio and the West are casts in limestone, and do not preserve the striæ.

Geological formation and locality. In the Upper Helderberg limestones throughout the limestone range from east to west in New-York, and in the Hamilton group in the western part of the State.

[August,

PLATYOSTOMA STROPHIUS (n. s.).

Shell obliquely ovoid. Spire ascending, composed of about three or four volutions : apex minute; volutions very gradually expanding above; the body-whorl ventricose, somewhat depressed-convex on the side, and sloping downwards rather than swelling out in a rotund form; the upper volutions standing out prominently above the last one. Suture-line narrow, even, and sometimes appearing as very narrowly and deeply canaliculate.

Surface marked by fine concentric striæ, which are sometimes crowded into wave-like fascicles or undulating folds, and sometimes abruptly bent forwards near the base. In some parts, or upon some specimens, these striæ are very regular and even, as in Strophostylus. Aperture ovate, and, in one specimen, with a sinus near the base.

This species is less ventricose than the *P. lineata*, and the spire much more elevated, while no revolving lines have been observed. In many respects it resembles Strophostylus, but the aperture has not been entirely determined.

Geological formation and locality. In the Corniferous limestone :

STROPHOSTYLUS UNICA (n. s.).

Shell suborbicular; height and length about as three to four. Spire consisting of three or four volutions; the apex moderately elevated above the outer volution. Suture close, and the volutions evenly convex upon the upper side. Body-whorl ventricose, evenly and equally rounded upon the back. Aperture subovate, a little extended at the lower side and slightly straitened on the posterior side : outer lip regularly curved ; columellar lip thickened and slightly twisted, the fold being near the upper part of the lip.

Surface marked by fine crowded concentric striæ, which are broadly curved backwards on the dorsum : shell very thick. At one point where the shell is broken away, the surface, within the cavity, is marked by revolving striæ.

The slight thickening and fold in the columellar lip distinguish this as a Strophostylus, while there is no indication of an umbilicus. The form of this shell differs little from *Platyostoma lineata;* but the even convexity of the spire, and usual absence of revolving striæ, are distinguishing external features.

Geological formation and locality. In Schoharie grit : at Schoharie.

PLEUROTOMARIA ARATA (n. s.).

SHELL depressed suborbicular. Spire moderately elevated : volutions three or four, gradually enlarging, the outer half of the body-volution being ventricose. Aperture somewhat transverse. m

SURFACE marked by strong distant angular ridge-like striæ parallel to the finer lines of growth; a strong band marking the periphery of the shell.

This species is abundant in the Schoharie grit, in the condition of casts of the interior : individuals are rarely found, retaining the shell in greater or less perfection; and some of the stronger markings are not unfrequently preserved on the casts, or as impressions of the exterior upon the surrounding matrix. The diameter of the shell is from one inch to two and a quarter inches, and the vertical height in the largest specimens is about an inch and a quarter. The shell appears to have been distinctly umbilicate.

Geological formation and locality. In the Schoharie grit : Helderberg mountains and Schoharie.

PLEUROTOMARIA LUCINA (n. s.).

Euomphalus? rotundus : Geol. Report 4th District New-York, 1843, p. 172, f. 4. ot *Pleurotomaria rotundata* of MUNSTER.

SHELL suborbicular. Spire elevated : volutions about four; apex minute. Volutions gradually expanding to the last one, which becomes very regularly ventricose, with the aperture expanded and nearly round, or extended on the lower side with a shallow notch on the anterior margin. Upper side of the volutions very symmetrically convex : suture neatly defined, slightly canaliculate. Lower side of the body-volution convex in the middle, and gradually depressed into the umbilicus.

SURFACE beautifully cancellated by concentric and revolving striæ, which, in many specimens, are of equal strength. Periphery marked by a moderately wide band, on which the striæ are turned abruptly backwards : this band is limited by stronger striæ or narrow ridges, and sometimes one or two slender revolving striæ are within the extent of the band.

This species is well marked by its symmetrically rotund form and the regular convexity of the volutions, even in casts of the interior when not compressed. There is some variety in the surface-markings of specimens which appear all to belong to this species. The concentric striæ are some-

times much coarser than the revolving striæ ; and finer striæ are implanted between the coarser, and do not reach the suture-line. In old specimens, the revolving band is a quarter of an inch in length. The species has had a wide geographical distribution, and its vertical range is not less than one thousand feet. A very symmetrical specimen has a diameter of a little more than two inches, and is nearly an inch and three-fourths in height. Another specimen, which has suffered some compression, has a breadth of about three inches, with nearly the same height of spire.

Geological formation and locality. In the Corniferous limestone : Helderberg mountains, Williamsville, Clarence-hollow, N.Y.; and Falls of the Ohio river. In the Hamilton group : York, Moscow, Geneseo, Skeneateles lake, etc., N.Y.

PLEUROTOMARIA DORIS (n. s.)

Shell very depressed-conical, the elevation of the spire being about two-thirds the width across the base of the shell. Volutions three or four, very gradually expanding, their elevation above the suture line being greater than the width exposed : body-volution moderately ventricose and rounded above; the periphery a little contracted vertically, and the lower side rounded and expanded more abruptly towards the aperture, gently depressed towards the centre, which is partially umbilicate. Aperture nearly circular.

Surface marked by strong revolving striæ, which are crossed by fine and less conspicuous concentric striæ, giving sometimes a denticulate character at the crossing of the two series. Shell of moderate thickness. Suture neatly defined, not canaliculate.

This species is less rotund than the *P. lucina;* the spire is more elevated, and the revolving striæ proportionally stronger.

Geological formation and locality. In the Schoharie grit, Schoharie; and in the Corniferous limestone, Clarence-hollow, Erie county, N.Y.

PLEUROTOMARIA UNISULCATA (Conrad).

Pleurotomaria unisulcata : Conrad, Jour. Acad. Nat. Sciences, Philadelphia, 1842, pag. 271, pl. 16, f. 9.

" Short-fusiform : spire conical-depressed; upper surface of the
" large volution slightly concave from the outer margin to a ca-
" rinated line which borders a transversely rugose sulcus; an-
" other, but more obtuse line, margins the suture; penultimate
" whirl rounded, obtusely carinated at the suture; base nearly

" rectilinear towards the labrum, slightly convex above the aper-
" ture."

Until the present time, I have failed to recognize in our limestones any species of PLEUROTOMARIA that could be identified with the *P. unisulcata* of CONRAD. I have now before me an imperfect specimen which has the form and proportions of spire and body-whorl, with a strongly banded suture, represented in the figure of *P. unisulcata*. The apex is imperfect, and the upper side of the body-volution a little more flattened; the aperture also is imperfect, but has the form given in the figure of CONRAD. Some portions of the shell show concentric and revolving striæ; but the back of the outer volution is too imperfect to show any spiral band, though the bending of the striæ indicates a sinuosity in the dorsal angle of the peristome.

Geological formation and locality. In Upper Helderberg limestone at Schoharie.

PLEUROTOMARIA LINEATA.

Turbo lineata : HALL, Geol. Report 4th District New-York, 1843, p. 193, f. 1.

SHELL turbinate. Spire ascending, higher than wide. Volutions four or five, regularly and evenly convex, gradually expanding to the body-whorl which is ventricose, rounded below and concave in the middle : umbilicus small or none. Aperture round. mm

SURFACE marked by equal regular revolving striæ on the upper and lower sides of the volutions, which are crossed by fine concentric striæ : these, on the periphery, are bent abruptly backwards along a broader space than is usual between two revolving striæ, and sometimes there is a distinct band upon the periphery.

This species varies in form and proportions, from compression and accident, so that some specimens are proportionally much more elevated than others. In the soft calcareous shales of the Hamilton group, this fossil usually occurs in the form of casts, and it is not unfrequently covered by encrusting coral or bryozoa. In its greatest height, the shell reaches nearly an inch. A very symmetrical specimen measures about seven-eighths of an inch in height, with an equal breadth.

Geological formation and locality. In the calcareous shales of the Hamilton group; Seneca and Cayuga lakes.

PLEUROTOMARIA CAPILLARIA (CONRAD).

Pleurotomaria capillaria : CONRAD, Jour. Acad. Nat. Sciences, Philadelphia, 1842, Vol. viii, pa. 271, pl. 16, f. 11.

"Turrited volutions slightly angulated below the middle, with "spiral carinated lines; the second and third lines from the "suture, on the upper part of the volutions, more distant from "each other than from the adjoining striæ : upper part of the "volutions very obliquely rectilinear. Surface with equal sharp "lines which cross the volutions obliquely."

In the coarser shales of the Hamilton group, there is a species of PLEUROTOMARIA corresponding to the figure given by Mr. CONRAD. The intermediate revolving striæ on the upper side of the volution are faintly defined, and may become obsolete : the volution is a little flattened upon the upper side, with a prominent band upon the periphery.

In the limestone of the Upper Helderberg, below the Hamilton group, there are specimens of PLEUROTOMARIA of nearly the same form and character as those here mentioned in the Hamilton group; but the species is more slender and the body-whorl is proportionally more ventricose than those in the Hamilton group, and the concentric striæ are much more closely arranged. This variation may be due to difference of physical conditions, and not be of specific importance.

Geological formation and locality. In the Hamilton group at Cazenovia and Skeneateles, etc.

PLEUROTOMARIA TRILIX (n. s.).

SHELL subconical, higher than wide, consisting of three or four volutions, the first of which are small; the last one ventricose and angular on the periphery, and concave below, with a distinct umbilicus.

The surface is marked by concentric striæ, which are closely arranged and little elevated. On the last volution there is a distinct carina just below the suture, and the periphery is triply carinate, enclosing two depressed bands, upon which the concentric striæ are abruptly bent backwards from the aperture. At a distance below the periphery equal to that between the upper carina and the central one, are one or two carinate revolving lines.

This species, though observed only in imperfect specimens, is readily distinguished from any others of the group.

Geological formation and locality. In the shales of the Hamilton group: Seneca lake shore, N.Y.

PLEUROTOMARIA SULCOMARGINATA (CONRAD).

Pleurotomaria sulcomarginata : CONRAD, Jour. Acad. Nat. Sciences, Philadelphia, Vol. viii, pa. 272, pl. 16, f. 13.

" Trochiform : outer margin of the large volution bicarinated, with " an intermediate sulcus; volutions with two distant spiral lines, " and crossed by oblique striæ."

This is the most common species of PLEUROTOMARIA in the Hamilton group, occurring in all places east of Seneca lake, and often abundant in the coarser shales of Madison county. To the west of Seneca lake it is very restricted in its vertical range, and is comparatively rare. The form is usually depressed-trochiform, though sometimes seven-eighths of an inch high, with a diameter of one inch. The retral bending of the sharp concentric striæ, the distinct carina just above the suture in the upper volutions, and the spiral band on the angular periphery, are distinguishing features. The casts are, however, often rounded on the periphery ; and some specimens in this condition from Maryland measure one inch and a half in diameter and one inch and three-eighths in height, and consist of about five volutions.

PLEUROTOMARIA ROTALIA (n. s.).

SHELL small, depressed-trochiform. Spire consisting of about four volutions. Apex minute, the volutions gradually expanding to the aperture : slope of the spire from the apex to the periphery nearly in the same plane, being very slightly convex. Aperture subquadrate.

SURFACE very finely and closely striate : striæ not prominent; periphery marked by a narrow band ; suture-line depressed and narrowly canaliculate.

This species has nearly the form of *P. sulcomarginata;* but the band on the periphery is scarcely depressed, there is no carination above the suture-line, and there are no sharp elevated striæ. The largest specimens seen are half an inch in diameter and three-eighths of an inch in height.

Geological formation and locality. In the compact shale or calcareous rock of the Hamilton group, at Pratt's falls, Madison county, N.Y.

PLEUROTOMARIA EUOMPHALOIDES (n. s.).

SHELL depressed-orbicular. Volutions three or four, rising little above the plane of the outer volution, and increasing very gradually to the aperture, which is transversely broad elliptical.

SURFACE concentrically striate, with a band upon the periphery.

The specimens examined are almost entirely casts; some remains only of striæ being preserved. The spire is less elevated than in the *P. sulcomarginata*, and the periphery and upper side of the last volution more rounded. It is possible that these casts may prove identical with the preceding species (*P. rotalia*); but no specimens with so great a diameter have been observed, and the spire is more depressed than in that species.

Geological formation and locality. In shales of the Hamilton group: at Hamilton, Madison county; and at Fultonham, Schoharie county, N.Y.

CYCLONEMA HAMILTONIÆ (n. s.).

SHELL subconical: height a little more than the width across the last volution. Volutions four or five: apex minute and gradually expanding to the body-whorl, which is somewhat abruptly ventricose, flattened or a little concave for a short distance below the suture, and the space limited on the lower side by a carina or the first of a series of strong revolving striæ.

SURFACE marked by fine lamellose lines of growth, which are directed backwards from the suture without bending or curvature. The volutions, except the narrow concave space above, are marked by strong revolving striæ or elevated carinate lines, of which there are from fourteen to eighteen on the body-whorl.

This species has nearly the proportions of *Pleurotomaria lineata*, except in the more abrupt ventricosity of the body-volution. The concave belt on the upper side of the volution, which is without revolving striæ and marked only by lines of growth, is a distinguishing feature; and also the absence of elevated concentric striæ and the band upon the periphery.

Geological formation and locality. In the shales of the Hamilton group: Cazenovia, N.Y.

CYCLONEMA LIRATA (n. s.).

SHELL robust, subdepressed-conical. Volutions about four, subangular, the last one becoming very ventricose: upper side of volutions flattened from the suture to the first carinate elevation.

SURFACE marked by fine closely arranged striæ of growth, which are sometimes crowded in fasciculi giving gentle inequalities: these striæ are directed a little backwards from the suture. The volutions are marked by moderately elevated carinate ridges, of which

two or three are visible on the upper volutions, and about five on the body-whorl; those on the upper side of the volution more distant than those on the lower side.

The larger specimens are about an inch in diameter, with a height about one-fourth greater.

Geological formation and locality. In the coarse sandy shales of the Hamilton group, in Chenango county, N.Y.

CYCLONEMA MULTILIRA (n. s.).

SHELL turbinate, ventricose. Volutions five or more : body-whorl very large and extremely ventricose.

SURFACE marked by fine concentric striæ of growth, which are directed backwards from the suture towards the periphery, and pass to the lower side of the volution without deviation, except in the slight undulation at the crossing of the revolving lines. The surface of the volutions is marked by strong elevated revolving lines, of which there are about five or six upon the upper volutions, and ten or twelve on the body-whorl : the space from the suture to the upper of these lines is greater than between the lines, those of the periphery being more closely arranged than those above or below.

This species is similar in form to *C. lirata*, with the last volution more ventricose and all the volutions less angular; and the revolving carinate lines are twice as numerous and not so strong. It is intermediate between the *C. hamiltoniæ* and *C. lirata;* being a little more ventricose than either, without the flattened or concave band on the upper side of the volution.

Geological formation and locality. In the coarse shales of the Hamilton group at Smyrna, Chenango county, N.Y.

MACROCHEILUS HEBE (n. s.)

SHELL turreted, subfusiform; length less than twice the diameter. Volutions nine, upper ones minute, the last two ventricose; one-half the height of each volution showing above the suture. Shell thick on all parts, and more extremely so near the aperture. Aperture longitudinally suboval, somewhat pointed below. Surface marked by extremely fine lines of growth. Height a little more than three-fourths of an inch.

This shell has all the characters of the Genus Macrocheilus as occurring in the Coal measures, and is the second well-marked species I have observed in the Hamilton group. This species resembles the *M. newberryi* of the Coal measures; but the two last volutions are more ventricose, the suture-line close, while the shell, of less length, has one more volution. From the *M. ventricosus* it differs in the larger and less attenuated spire, while the two last volutions are ventricose.

Geological formation and locality. In the Goniatite limestone of the Hamilton group at Manlius, N.Y. Collected by C. A. White.

MACROCHEILUS HAMILTONÆ (n. s.).

Shell very ventricose. Spire short, consisting of four or five volutions, the last one extremely ventricose, making nearly two-thirds the entire length of the shell. Aperture longitudinally oval, obtuse below. Shell distinctly striated by fine lines of growth. Suture-line deeply impressed. Length about one inch, with a diameter of nearly three-fourths of an inch.

This shell resembles in some measure the shorter and more ventricose forms of the Coal measures, the spire resembling that of *M. primigenius*.

Geological formation nad locality. In the coarse shales of the Hamilton group at Hamilton, Madison county, N.Y.

MACROCHEILUS (HOLOPEA) MACROSTOMUS (n. s.).

Shell short, subglobose. Volutions about four or five, all above the last two minute, the last one extremely ventricose, so that the width from the columella is about two-thirds the height of the volution : greatest width of the shell equal to the height. Aperture rounded, a little extended on the lower side.

Surface marked by fine equal striæ of growth, which are strongly directed backwards from the suture. Suture-line a little depressed below the plane of the convexity of the volution; the striæ sometimes crowded in fascicles.

This species resembles in form some of the Platyostomæ; but the texture of the shell and surface-markings are not in accordance with the well-marked species of that genus. In surface-characters and form of shell it is similar to Holopea; and having no positive knowledge of the aperture and columella, it is impossible to decide that it may not belong to that genus.

Geological formation and locality. In calcareous beds of the Hamilton group at Pratt's falls, Madison county, N.Y.

MURCHISONIA DESIDERATA (n. s.).

SHELL elongate, turritiform. Spire somewhat rapidly ascending: volutions ten or more, the five lower ones gradually enlarging, and the last one scarcely more ventricose than the preceding; flattened on the upper side, and a little more convex below the spiral band. Aperture somewhat elongate; the columellar lip thickened, and bounded by a well-marked callosity.

SURFACE marked by distinct concentric striæ, which are raised in fascicles above the general surface of the shell, and, bending gently back from the suture, reach the spiral band, which is flattened and limited by moderately elevated revolving lines. The spiral band is slightly below the centre of the volution, and marked by the retral curving striæ, which are less prominent on this and the adjacent parts than near the suture. Suture close.

The height of five volutions from the mouth upwards is nearly two and a quarter inches, and the diameter of the last volution is seven-eighths of an inch. The length of the aperture is about five-eighths of an inch, and the width half an inch.

This species occurs in the same rock with *M. maia* and *M. leda*, and differs conspicously from either of them in the proportionally greater length of the volutions, and the distinct flattening upon the upper side. The suture-line in the present species is close, without indication of a groove, while the revolving striæ are less distinct than in those species.

Geological formation and locality. In Upper Helderberg or Corniferous limestone: Falls of Ohio; and probably among numerous casts of similar forms in New-York.

MURCHISONIA TURRICULA (n. s.).

SHELL small, turritiform. Volutions about eight or nine, angular, rapidly increasing from the apex, the last one not more ventricose than the preceding, flattened above and a little convex below the spiral band. Spiral band strongly elevated, distinctly bounded by sharply carinated revolving lines, and below the centre of the upper volutions.

SURFACE marked by strong elevated concentric striæ above the band, which are less conspicuous below it. Suture-line sharply marked by the deep contraction of the shell: on the last voluion, the' suture-line is continued in a slender spiral line beyond the margin of the lip.

This minute species has a length of about a quarter of an inch, and possesses in some degree the character of the species last described; but the volutions are more angular and the suture-line more deeply impressed, while the concentric striæ and the spiral band are proportionally much stronger. Six specimens have been examined.

Geological formation and locality. In the Hamilton group.

GENUS LOXONEMA (Phillips).

In the Schoharie grit, and in the limestones above this rock, there are numerous casts, which, though evidently belonging to different species of Loxonema or Murchisonia, cannot readily be distinguished in the absence of surface-markings. Several species of these genera have already been described (14th Regents' Report, pp. 103, 104), from specimens retaining the surface-markings. There are other forms still, which, although we have no specimens with the shell preserved, nevertheless differ so widely from the others as to be distinguished by the form and proportions of the casts.

One of these from the Schoharie grit has the form and proportions of *L. attenuata* of the Upper Pentamerus limestone; and in the casts, no means exist of pointing out characters which will distinguish the one from the other. Other specimens resemble the *L. compacta;* but a careful comparison shows the volutions to be a little more rotund, and the spire more rapidly ascending. The determination of species in this condition is attended with many difficulties, and in the end there must still remain some doubt when the differences of form and proportions may have been disguised by pressure or accident. Under these circumstances, I have ventured to characterize two or three species among the specimens which occur in the condition of casts.

LOXONEMA SOLIDA (n. s.).

Shell turritiform, elongate. Spire gradually ascending: volutions moderately convex, the height of each one about half the diameter of the spire at the same point.

In a specimen of moderate size, five volutions from near the base measure one inch in vertical height.

This species is intermediate between *L. compacta* and *L. obtusa* in proportions of spire, and the volutions are slightly more convex. The specimens are all imperfect, without the shell, and are only to be distinguished by the form and proportions of the volutions.

Geological formation and locality. In Schoharie grit: Schoharie.

LOXONEMA? SUBATTENUATA (n. s.).

A cast of a species having proportions nearly similar to *Murchisonia maia* occurs in the Schoharie grit; but the shell has tapered somewhat more rapidly, the volutions are more ascending and less convex, and the form of the aperture is subovate and narrowed below. The length from base of aperture to top of the sixth volution is one inch and three-fourths, and the diameter of the last volution is about five-eighths of an inch.

In this species the volutions are less ascending, and the spire less attenuate than in *L. attenuata* of the Lower Helderberg group, which in many respects it resembles.

Geological formation and locality. In Schoharie grit : Schoharie.

LOXONEMA ROBUSTA (n. s.).

Shell robust, terebreform. Spire rapidly ascending : length from the base of aperture to summit of fourth volution, three inches; above this there have probably been three or four volutions, adding to the length about three-fourths of an inch. Volutions moderately convex above the middle and flattened below, the last one slightly more ventricose : the diameter of this last is nearly an inch.

This is a larger and more elongate species than any other of the genus in the Upper Helderberg rocks. The specimen is a cast, having no surface-markings; but from the general character of the fossil, the flattened volutions and close suture-line, I am induced to refer it to the Genus Loxonema. A fragment of nearly the same proportions, and occurring in the same association, has a banded suture, and is clearly distinct.

Geological formation and locality. In Schoharie grit : Schoharie.

LOXONEMA DELPHICOLA (n. s.).

Shell turritiform. Spire somewhat rapidly ascending : volutions eight or more, flattened upon the sides, the last one slightly ventricose. Aperture ovate, narrowed and attenuated below : columella thickened and extended below.

Surface marked by strong, not prominent, longitudinal striæ, which are bent slightly back for a short distance below the suture, and continue in a nearly direct line almost to the base of the volution, where they bend forward to the suture-line. Suture banded, or

the upper edge of the volution overlapping the next preceding one, and constricted just beneath the margin, which is but faintly or not at all marked by the longitudinal striæ

This species differs from the more common form of Loxonema of the Hamilton group in the lesser convexity of the volutions, straightness of striæ (which, however, are more abruptly bent on the last volution), and the overlapping or banding of the upper margin of the volution at the suture-line. One specimen examined retains nearly six volutions, and has a length of one inch and a half; which would have been slightly increased, had the lower extension of the columella been entire : diameter of last volution half an inch. A specimen of the ordinary form, possessing six full volutions, measures one and a quarter inches in length; the six volutions from the aperture reaching to the height of the fourth volution in the species under consideration.

Geological formation and locality. In shales of the Hamilton group : Delphi, Onondaga county, N.Y.

LOXONEMA HAMILTONÆ.

Loxonema nexilis : Geol. Report 4th District New-York, 1843, p. 201.
Not *Loxonema nexilis* of Phillips.

Shell elongate, subulate. Volutions convex, about thirteen in the largest specimens, very gradually increasing in size from the minute apex, the last one ventricose. Aperture ovate, narrowing below : columella extended.

Surface marked by longitudinal sharp curving striæ, which bend backwards from the suture and forwards towards the base of the volution, having the greatest curve near the middle : striæ separated by sharply defined grooves, which are a little wider than the ridges; the striæ increasing in distance as the shell grows older.

A specimen showing thirteen volutions measures one inch and three-eighths in length, and the diameter of the last volution is half an inch.

This species is the common form in the Hamilton group, and differs from the preceding in the more numerous and more convex volutions, as well as in the more strongly arched striæ and more extreme attenuation of the shell. I have heretofore identified this species with the *L. nexilis* of Phillips; but its form and proportions are intermediate between that and *L. sinuosa*, while the striæ are curved as in the latter species. The figures of Phillips represent the striæ a little curved backwards at their upper extremities, with an enlargement just below ; features which our species does not possess 1861.]

Geological formation and locality. In shales of the Hamilton group : at Seneca and Cayuga lakes ; at Eighteen-mile creek, and more commonly in the shales east of Cayuga lake, at Delphi and other places.

GENUS EUOMPHALUS (Sowerby).

EUOMPHALUS CLYMENIOIDES (n. s.).

Shell discoid. Spire depressed below the plane of the outer volutions : volutions about four or five, lying nearly in the same plane, slender and very gradually expanding, rounded above and below, the lower side the most convex, the section transversely ovate, narrower on the ventral or inner side of the volutions, the vertical and transverse diameters about as twelve to thirteen. Aperture transverse, subovate. Surface unknown. Diameter of shell, in the largest specimens seen, one inch and a half.

This species is known to me in the condition of casts only ; but its form and proportions furnish marked characters. The casts sometimes show impressions of transverse striæ, which are at intervals apparently crowded in fascicles. The spire is more depressed than in *E. planodiscus* of the Goniatite limestone, while in that the section of the volutions is nearly circular.

Geological formation and locality. In the Schoharie grit : Schoharie.

EUOMPHALUS LAXUS (n. s.).

Shell discoid. Volutions about four, nearly in the same plane, disjoined throughout their entire extent, very gradually and regularly expanding from the apex : section circular. Aperture (as far as known) subcircular, scarcely expanded.

Surface marked by crowded transverse striæ, which are sometimes regular and equal, and, on some parts of the shell, more closely arranged, and all directed a little forwards from the inner side of the volution.

The greatest diameter of the largest specimen seen is one inch and five-eighths, and the diameter of the volution at the aperture is half an inch.

This species differs from any other in this series of strata, in the distinct separation of the volutions throughout their entire length. The impressions in stone are strongly marked by the transverse striæ, and the casts preserve fainter impressions of the same markings.

Geological formation and locality. In the Corniferous limestone at Schoharie, and in the Hamilton group at Eighteen-mile creek and Alden in Erie county, and in the same formation in Otsego county, N.Y.

[September,

EUOMPHALUS EBORACENSIS (n. s.).

SHELL discoid. Volutions subrotund, the section somewhat pentahedral, the upper side a little flattened, regularly curving on the inner side, narrowed and flattened on the lower side; the dorsal side presenting two narrow flattened faces with an obtuse angle between : towards the aperture, the inner side becomes straight and the lower side scarcely flattened.

SURFACE marked by closely arranged lamellose striæ, which are crowded and fasciculate, giving a somewhat rough exterior.

The entire form and character of this species are not determined; the specimen examined being imperfect.

Geological formation and locality. In the shales of the Hamilton group at Eighteen-mile creek in Erie county, and at York in Livingston co. N.Y.

GENUS BELLEROPHON (MONTFORT).

BELLEROPHON CURVILINEATUS (CONRAD).

Bellerophon curvilineatus : CONRAD, Jour. Acad. Nat. Sciences, Philadelphia, 1842, Vol. viii, pa. 269, pl. 16, f. 7.

" Discoid : volutions exposed; back sharply carinated; surface with " oblique arched striæ."

This species, cited by Mr. CONRAD as occurring in the Onondaga limestone, is more abundant in the Schoharie grit, though in this rock it rarely preserves the shell. The shell is discoidal ; the volutions four or five, compressed and sharply carinated on the back, each one embracing about half the width of the preceding one, the last one not more ventricose than the preceding, and bending almost rectangularly at the umbilical edge. Aperture triangular, acute at the anterior margin, which is deeply sinuate ; the curvature of the peristome from the umbilical side receding about one quarter of a volution to the dorsal line. The inner margins of all the volutions are exposed in the cavity of the umbilicus. Surface marked by fine striæ of growth, which are slightly fasciculate and follow the curvature of the aperture, making a retral curve of about one quarter of a volution. The dorsum is sharply carinate.

The casts of this species are angular on the back, showing a wide umbilicus.

This species has somewhat the form and proportions of the *B. dubia* of D'ORBIGNY ; but the umbilicus is proportionally larger, and the outer volution less rapidly widening towards the aperture.

Geological formation and locality. In the Onondaga limestone and Schoharie grit, at Schoharie and the Helderberg mountains.

BELLEROPHON (BUCANIA) PELOPS (n. s.).

Casts of this species occur in the limestone of the Upper Helderberg group.

The shell has been very rotund : the volutions, which have been three or four, were exposed in the umbilicus; the transverse diameter of the volution is about twice as great as the length or dorso-ventral diameter, rounded on the back, and abruptly bent into the umbilicus; the aperture expands laterally, and is somewhat reniform, with a sinus on the dorsal side; the back is distinctly carinate on the last volution, and the surface has apparently been marked by transverse striæ.

It is impossible to characterize the species fully from the materials possessed, but it may be distinguished by its similarity of form to *B. expansus;* but the dorsal carina on the cast of this one is more sharply marked, the volutions are less compressed in the dorso-ventral direction, and the umbilicus is more abruptly depressed.

Geological formation and locality. In the Schoharie grit at Schoharie, and in the limestones of the Upper Helderberg group at Clarence-hollow, N.Y.; and Brownville, Ohio.

BELLEROPHON ACUTILIRA (n. s.).

SHELL subglobose; the first volutions discoidal, and the body volution towards the aperture very ventricose; aperture expanded; peristome moderately sinuate in the middle in front; spire closely enrolled.

SURFACE marked by regular and subequidistant striæ, which, bending forward from the ventral edge of the volution, make a broad curve on the side, and are abruptly bent backwards, making a sharp (∧-shaped) angle on the dorsal line, which is acute on the upper part of the last volution, but becoming regularly convex, with a less abrupt curvature of the striæ upon the more expanded part towards the aperture.

In one specimen of this shell, I find characters corresponding to those given by Mr. CONRAD to *B. brevilineatus.* The striæ proceeding from the umbilicus are well marked at first, but become obsolete on the side of the volution, but are well marked again on the dorsum. This character obtains only on the last half of the outer volution, and above this the striæ are uniform over the whole surface : the periphery is obtusely angular, but not acute; and it does not appear, therefore, that this can be identical with the species of CONRAD. At certain periods in the growth of the shell, the sinuosity in the anterior side of the peristome has been very deep and acute; but at a later period, the character has become gradually less extreme.

Geological formation and locality. In the shales of the Hamilton group at Hamilton in Madison county, N.Y.

BELLEROPHON PATULUS.

Bellerophon patulus : HALL, Geol. Report 4th District New-York, 1843, p. 196, f. 1.

SHELL subglobose, ventricose : umbilicus small; volutions rounded, the last one near the aperture abruptly and widely dilated, overlapping the volution on the posterior side. The upper part of the last volution is marked on the back, and partially upon the sides, by strong, even, arching striæ, which are more abruptly bent on the dorsal line. These striæ become obsolete on the middle and lower sides of the volution and upon the broad expansion towards the aperture, which is marked only by fine striæ of growth; and these are sometimes a little more crowded, giving an undulating surface. Anterior margin of the peristome with a broad shallow sinuosity at the upper side of the last volution : some revolving striæ are observed crossing the others.

Nearly all the specimens examined are more strongly striate on the back of the volution above the expansion, than the one figured in the Geological Report of the Fourth District, but in other respects there is no important difference.

The aperture in the transverse diameter measures a little more than one inch and five-eighths, and in the longitudinal direction one inch and a quarter. Another specimen has a diameter of aperture of nearly two inches.

Geological formation and locality. In the coarse shales of the Hamilton group in Schoharie county, at Hamilton in Madison county, at New-Berlin and other places; and also in the soft calcareous shales of the shore of Lake Erie at Eighteen-mile creek.

BELLEROPHON RUDIS (n. s.).

SHELL extremely ventricose; the first volutions rounded and subglobose, with a small umbilicus. The last half of the body-volution is abruptly expanded, and the peristome spreading almost rectangularly to the axis of the shell. Anterior margin of the peristome slightly sinuous, and spreading on the posterior side over the preceding volution. The upper part of the last volution is

marked by strong transverse arching ridges which are closely arranged, but; approaching the aperture, they become irregular, and more distant from each other : the expanded portion has two or three strong folds or wrinkles parallel to the margin of the peristome, which are stronger in front and become obsolete on each side of the expansion. The sides of the last volution are marked by longitudinal ridges which reach nearly to the margin in front, but in some parts are irregular and obscure.

This shell resembles in form the *B. patulus*, but is more robust, the transverse striæ stronger, and the concentric folds on the expanded portion of the shell, as well as the longitudinal ridges on the sides, are characters not possessed by that species. The transverse diameter is about one inch and three-fourths, and the longitudinal diameter one inch and a half.

The *B. patulus* and *B. rudis*, in the broad posterior expansion of the peristome, which is not joined to the volution, resemble the PHRAGMOSTOMÆ, to which genus they may belong. The large size and rotundity of the volution beyond the aperture, in the absence of positive knowledge of the interior, has induced me to place them under BELLEROPHON.

Geological formation and locality. In the coarse shales of the Hamilton group at Fultonham, Schoharie county, N.Y.

BELLEROPHON LEDA (n. s.).

SHELL subglobose, a little flattened upon the dorsum. Body-whorl ventricose : aperture very wide; peristome abruptly spreading and broadly sinuate in front, with sometimes a deeper notch in the middle.

SURFACE marked by strong longitudinal or revolving striæ, which alternate in size, and are often finer and more numerous on each side of the dorsal band. The revolving striæ are cancellated by finer transverse striæ. On the dorsum there is a narrow band which is not elevated, or sometimes scarcely raised above the surface, marked by two or three revolving striæ, and upon which the transverse striæ make an abrupt retral curve. In the exfoliation of the shell, and even in the best preserved specimens, the elevated transverse striæ sometimes become obsolete towards the aperture; and the revolving striæ, becoming obsolete also, leave a border marked only by the striæ of growth.

The usual length of the shell, as seen in the calcareous shale, is about half an inch, with a width of about five-eighths of an inch;

and a large well-preserved specimen, with expanded aperture, measures seven-eighths of an inch from the back of the dorsum to the front of the aperture, and the aperture has a transverse diameter of one inch and a half.

This species resembles in form and surface-markings the *B. decussatus* of FLEMING = *B. elegans* and *B. clathratus* of D'ORBIGNY, and *B. cancellatus* of HALL.

This species is well marked, and readily distinguished from any other in the formation, except the following species (*B. lyra*), which bears some resemblance, but is more evenly expanded and with different surface markings. The broadly expanded aperture, with nearly smooth borders, is rarely seen in ordinary specimens. In specimens of this character, however, the dorsal band is sometimes much elevated near the front.

Geological formation and locality. In the Hamilton group : Lake Erie shore at Hamburgh, N.Y.

BELLEROPHON LYRA (n. s.).

SHELL subglobose; the last half of the body-volution very ventricose and abruptly spreading towards the aperture, which is extremely expanded and round-oval in form, a little wider than long. Peristome distinctly sinuate in front.

SURFACE marked by regular even revolving striæ, which are wider than the spaces between them; or the larger ones appearing to be composed of two or three smaller ones, with a narrow scarcely impressed line between. These striæ are slightly undulating and very distinct, to near the aperture, where they terminate in a narrow smooth border, which is not thickened exteriorly. There are no distinct transverse striæ, though faint lines of growth are visible under a lens. The dorsum is marked by an elevated carina, which is crossed by distinct elevated arching and subimbricating or lamelliform striæ or ridges, at the distance of about two or three in the space of a line.

This species bears some resemblance to *B. leda;* but the aperture is more equally and less abruptly expanded, and there are no conspicuous transverse striæ, while the revolving striæ are broader, and the dorsal band elevated into an obtuse carina with distant imbricating striæ. Length of aperture about seven-eighths of an inch, with a transverse diameter of an inch.

Geological formation and locality. In the coarser shales of the Hamilton group at Fultonham, Schoharie county, N.Y.

BELLEROPHON OTSEGO (n. s.).

SHELL subglobose. Body-volution ventricose, somewhat trilobate, the middle much wider than the lateral lobes, gradually spreading towards the aperture, which is moderately expanded and somewhat deeply sinuate in front.

SURFACE marked by regular transverse arching striæ, which have a retral curve upon the dorsum. Dorsum marked by a narrow band, enclosed between two sharp elevated striæ, which are distant from half a line to a line, varying with the size of the shell.

The lateral lobes are separated from the central or main part of the volution : this character, with the comparatively wide dorsal band limited by thin sharp striæ, are characteristic features.

Geological formation and locality. In the coarse sandy shale of the Hamilton group in the south part of Schoharie county, and in Otsego county.

BELLEROPHON THALIA (n. s.).

SHELL ovoid or subspheroidal. Volutions rotund, the last one gradually expanding and becoming ventricose towards the aperture, which is somewhat orbicular, with a deep sinus at the anterior margin : umbilicus closed.

SURFACE with fine even concentric striæ. Dorsum, in the cast, marked by a sulcate carina.

This species occurs as casts of the interior, and retaining portions of the shell showing a surface-marking similar to *B. bilobatus* of the Lower Silurian rocks ; and the shell has nearly the same form and proportions, with the exception of the carinate dorsum.

Geological formation and locality. In the shales of the Hamilton group at York in Livingston county, and at Pratt's falls in Madison county, N.Y.

GENUS PHRAGMOSTOMA (HALL).

PHRAGMOSTOMA NATATOR.

Bellerophon expansus? Geol. Rep. 4th District New-York, 1843, p. 244, f. 3; p. 243. Not *Bellerophon expansus* of SOWERBY.

This species shows a widely expanded aperture, with a deep sinuosity in the anterior margin : the sides of the shell are strongly undulated or wrinkled. The dorsum is marked by an obtuse angular

carina, upon which the striæ are acutely bent backwards and make a broad curve upon the sides of the volution. The spire is small, and closely incurved.

The accidental breaking of the apex of a specimen of this species, from the upper part of the Hamilton group, disclosed an extension of the lip on the ventral side into the cavity of the shell, forming a septum as in the typical forms of PHRAGMOSTOMA.

The shell preserves no evidence of revolving striæ, and the specimen from the Hamilton group presents characters similar to those represented in the figure cited.

I had originally referred this with doubt to *Bellerophon expansus* of SOWERBY, but later observations show it to be distinct. It is not improbable that the species of SOWERBY may prove to be a PHRAGMOSTOMA, and not a true BELLEROPHON.

Geological formation and locality. In the coarser shales of the Hamilton group in Chenango county, and in the shale of the Portage group at Cashaqua creek, Genesee county, N.Y.

GENUS CYRTOLITES (CONRAD).

CYRTOLITES? MITELLA (n. s.).

SHELL arcuate, subovoid, making altogether about two volutions in the same plane; the first volution very minute; the body-whorl rapidly expanding to the aperture, which is nearly circular with the peristome scarcely spreading, obtusely but distinctly angular on the dorsum; apparently not sinuate, or but slightly sinuate on the peristome.

SURFACE marked by regular sharply elevated transverse striæ, which, when partially exfoliated, give a lamellose striate surface : these striæ are scarcely bent in passing over the angular dorsum, and do not appear to be cancellated.

Geological formation and locality. In the shales of the Hamilton group at Cazenovia, Madison county, N.Y.

CYRTOLITES PILEOLUS (n. s.).

SHELL obliquely or arcuately subconical. Apex of the spire making a single slender volution and rapidly spreading below, distinctly angular on the back. Aperture nearly round, a little angular in front : peristome expanded, without apparent sinus.

SURFACE marked by distinct undulated revolving striæ, which become less conspicuous towards the aperture : obscure lamellose striæ of growth mark the surface transversely.

In this species the sides of the volution are less convex, and the dorsum more distinctly angular (or subcarinate) than in the preceding species. The equal undulating revolving striæ constitute a conspicuous difference between the two. In the casts, faint impressions of the revolving striæ are preserved.

Geological formation and locality. In the coarse shales of the Hamilton group at Hamilton and at Pratt's falls in Madison county, N.Y.

GENUS THECA (SOWERBY).

THECA LIGEA (n. s.).

SHELL elongate, triangular, compressed, very gradually tapering to an acute extremity. Length about twice the width, and the diameter from side to side equal to half the width. Margins thin and sharp; one side flattened or slightly convex, with a depressed line on each side a little within and parallel to the margin : opposite side convex, angular in the middle. Section triangular; the peristome on the flattened side produced beyond the opposite, curved and apparently thickened at the margin.

SURFACE marked by transverse lines of growth, which have been arched upon the angular side.

The specimen is a cast in limestone, preserving faint indications of the transverse striæ.

Geological formation and locality. In the Upper Helderberg limestone at Clarence-hollow, Erie county, N.Y.

GENUS CONULARIA (MILLER).

CONULARIA UNDULATA.

Conularia undulata : CONRAD, Ann. Rep. Palæontology of New-York, 1841, p. 57.

"Distinguished from *C. quadrisulcata* by having the striæ more "crowded and undulated, and by the absence of lines crossing "the furrow between the striæ."

This fossil is not rare in some localities of the Hamilton group. The longitudinal striæ crossing the furrows are obsolete, or nearly so, on the upper and middle portion of the shell, and sometimes faintly perceptible near the base.

This is a large species, frequently reaching the length of six inches. I am indebted to LEDYARD LINCKLAEN, esquire, of Cazenovia, for a specimen five and a half inches inches in length, the upper end of which is truncated by an arching septum; and at this point, each face has a width of more than half an inch. Had the shell been extended to an acute point in a line continuous with the sides, it would have been more than seven inches in length.

The occurrence of a septum in the upper part of the cavity of CONULARIA has been observed in specimens of at least three species from three different geological positions, and must be regarded either as a normal character of the shell, or that the apex may have been deciduous as the animal receded from that part of the shell, and this arrangement was adapted for its protection.

Geological formation and locality. In the coarse shales of the Hamilton group at Cazenovia, Hamilton and Schoharie, and in the Marcellus shale near Bridgewater, Oneida county, N.Y.

CEPHALOPODA.

GENUS CLYMENIA (MUNSTER).

CLYMENIA COMPLANATA.

Clymenia complanata : HALL, Geol. Report of the Fourth District New-York, 1843, p. 244, f. 5; p. 243.

SHELL discoid, flattened. Volutions four or five, slightly embracing, gradually enlarging towards the aperture.

SURFACE marked by fine regular striæ, which are directed a little forward from the ventral side of the volution, and, when near the dorso-lateral margin, bend backward into a shallow revolving groove, from which they make a very abrupt retral curve to the dorso-lateral angle. Some remains of undulating septa are visible in two specimens.

This species, described from a compressed specimen in the green shale of the Portage group at the mouth of Cashaqua creek, has been found in other places. The characters are pretty uniform as far as can be ascertained from the specimens, all of which are much compressed, so that the original form cannot be fully determined. Greatest diameter one inch and three-fourths; and the width of the outer volution, when extremely compressed, is nearly three-fourths of an inch.

Geological formation and locality. In the green shales of Cashaqua creek in the lower part of the Portage group, and in the upper part of the Hamilton group at Eighteen-mile creek, Lake Erie.

CLYMENIA ERATO (n. s.).

SHELL discoid. Volutions about three, besides the nucleus : centre depressed below the plane of the outer volution, which is moderately convex on the side, and embraces about one-third the width of the penultimate volution. Outer volution obtusely angular on the dorso-lateral margins, with a distinct revolving groove on the side about one-third the width from the dorsal margin . this groove, upon the inner volution, is visible within the suture line.

SURFACE marked by fine equal striæ, which are directed a little backwards from the ventral side of the volution, are fainter on the middle of the side, and, turning a little into the groove, are abruptly bent forward beyond it, and, upon the middle of the dorsal lobe, make a very sharp curve, turning backwards and reaching the dorso-lateral angle, which is slightly truncate (and, in crushed specimens, is marked by a shallow groove). The back is somewhat flattened : septa undetermined.

This species, in the largest specimens seen, is nearly two inches in diameter; and the outer volution, when flattened, is five-eighths of an inch from the ventral to the dorsal side. It differs from *C. complanata*, in having a lesser number and more robust volutions, the penultimate one of which is more embraced within the outer one; in the form of aperture, and conspicuously in the direction of the surface striæ.

Geological formation and locality. In a compact calcareous band at the top of the Hamilton group at Fall brook, Geneseo, and at Paterson's creek, Moscow, N.Y.

GENUS TROCHOCERAS* (BARRANDE, HALL).

TROCHOCERAS DISCOIDEUM (n. s.).

SHELL subdiscoid, making three or four volutions, broadly umbilicate on the lower side. Volutions contiguous, slender, gradually enlarging from the apex : peristome somewhat abruptly expanded;

* The Genus TROCHOCERAS was proposed almost simultaneously by M. BARRANDE and myself for fossil species generically similar, and without any concert of action, or of either being aware of the conclusions of the other. The name proposed by me was printed in the second volume of the Palæontology of New-York in 1850, although the volume was not issued till 1852; and it was only after this that I became aware that M. BARRANDE had published a Genus TROCHOCERAS.

aperture round. Septa distant about one-third the diameter of the tube. Shell thin or free from nodes or ridges, except towards the aperture, which appears to be thickened. Greatest diameter of the shell across the volutions, about two inches : diameter of the outer volution three-fourths of an inch.

Surface markings undetermined.

This species is more slender in its volutions than the *T. clio*, with a much wider umbilicus and a less elevated spire. Although I have seen but a single specimen, the form and proportions clearly indicate it to be a very distinct species.

Geological formation and locality. In the Schoharie grit : Schoharie.

GENUS GYROCERAS (Meyer).

GYROCERAS TRIVOLVIS (Conrad, sp.).

Cyrtoceras trivolvis : Conrad, Ann. Rep. Palæontology of New-York, 1840, p. 206.

"Shell large, rounded, with transverse lines of growth : septa " numerous."

This species is the most common one known in the Upper Helderberg limestones. So far as I know, however, it rarely or never reaches three volutions.

The tube is rounded; volutions disjoined, gradually enlarging to the aperture, which is not conspicuously expanded beyond the proportions of other parts of the shell; section of the volutions nearly circular, or round-oval : septa distant about one-sixth of the diameter. A fragment three inches long, measured along the centre of a longitudinal section, embraces sixteen chambers, and has a diameter in the middle of one inch and a quarter : the convexity of the septa, from the ventral to the dorsal side, is a little more than twice the space between the septa. Siphuncle subcentral, being a little excentric on the dorsal side. The shell is marked by close lamellose transverse striæ, and is raised in transverse ridges which are distant sometimes the space of one and sometimes of two septa, and usually directly over this part of the shell : these ridges have a slight retral bend on the back of the shell, giving a similar sinuosity to the aperture.

In many specimens the shell is not distinctly or decidedly annulate, but presents transverse undulations which are less conspicuous on the ventral side.

The *C. tricolvis* is the most common species in the Upper Helderberg limestones, and frequently measures six inches across the volutions.

Geological formation and locality. In limestone of the Upper Helderberg group in the Helderberg mountains, Schoharie, Oneida and Onondaga counties.

GYROCERAS MATHERI (CONRAD, sp.).

Cyrtoceras matheri : Ann. Report on the Palæontology of New-York, 1840, p. 206.

" Resembles the last, but the transverse ridges are more prominent
" and distant : they meet at an angle on the middle of the back."

This shell makes from one to one and a half volutions. Shell somewhat rapidly enlarging from the apex. Section nearly circular towards the apex, and becoming transversely elliptical towards the aperture, so that the two diameters are about as nine to twelve. Septa distant : where the dorso-ventral diameter of the shell is one inch, the distance of the septa on the side of the shell is nearly half an inch ; on the ventral side, three-eighths of an inch ; and on the dorsal side, five-eighths of an inch.

Surface marked by close lamellose striæ, which are abruptly arched backwards upon the dorsum, and the shell raised in strong ridges corresponding to the septa, which are abruptly bent backwards on the dorsal line. The casts show elevations along the line of the septa, corresponding to the exterior ridges, and the surface between is distinctly depressed. Faint revolving bands mark the surface of the casts, and each band is composed of several slender striæ. Specimens of the ordinary size measure from four to five inches across the greatest diameter.

This species differs conspicuously from *C. trivolvis* in the less circular form, more rapid enlargement, strong transverse ridges, and more distant septa.

Geological formation and locality. In the Upper Helderberg limestones at Schoharie and near Catskill.

GYROCERAS UNDULATUM (VANUXEM, sp.).

Cyrtoceras undulatus : VANUXEM, Geological Report Third District New-York, 1843, pp. 139 & 140, f. 2.

SHELL consisting of two or three free volutions, which are gradually expanded towards the aperture. Volutions scarcely symmetrical; section somewhat obliquely oval as in TROCHOCERAS, though the volutions are apparently in the same plane : transverse diameter of the volution greater than the dorso-ventral diameter. The septa are distant about one-fourth the ventral diameter.

SURFACE strongly striate or lamellose, the lamellæ arching backwards : on the dorsal line, and on the dorso-lateral angles, the lamellæ are sharply bent backwards at every fourth volution, forming two rows of lamellose nodes or short spine-like processes. The greatest diameter across the volution is about five and a half inches.

This species differs conspicuously from either of the preceding in the form of the volutions, and particularly in the arching node-like processes on the dorso-lateral angles.

Geological formation and locality. In the Upper Helderberg limestone: Oneida and Schoharie counties, and in the Helderberg mountains.

GYROCERAS NEREUS (n. s.).

Shell subdiscoid, making a little more than one volution. Volutions rotund, somewhat rapidly increasing in size : section nearly circular; septa, in the middle of the last volution, distant about one-fifth of an inch.

Surface marked by fine undulating striæ of growth, and, at unequal distances of a little less than a line, the shell is produced in sharply undulating lamellæ, which are produced at right angles to the axis of the shell.

In this external character, the shell differs from the other species in this formation. In a specimen of medium size, there are eight of these lamelliform ridges in the space of an inch ; and in another larger individual there are seven in the same distance, while towards the apex there are twelve. The greatest extent across the volutions is six inches. The best specimen is flattened, so that the proportions cannot be fully determined.

Geological formation and locality. In the Corniferous limestone : at Auburn, N.Y.

GYROCERAS ERYX (n. s.).

Shell large, making one or two volutions. Volutions very rotund, gradually expanded to the outer cavity, which appears to be proportionally a little wider and very deep.

The specimens which I have seen are all imperfect, but could not have made less than one and a half volutions. One specimen consists of a part of the septate portion of a small or medium-sized individual, and, making nearly two-thirds of a volution, measures about four and a half inches across the disc : at the larger end, the dorso-ventral diameter is an inch and a half; and at the smaller end, nearly an inch. At the smaller end of this specimen there are eight chambers in the space of an inch ; and at the larger end, nearly five in the same distance measured upon the side of the volution. A larger specimen, which appears to be nearly complete at the aperture and makes the greater part of one volution, measures eight inches from the outer sides across the disc : this diameter may have been a little increased

by compression. The dorso-ventral diameter of the mouth is three inches; which, allowing for pressure, may have been originally two and a half inches. After making two-thirds of a volution, the diameter is about one inch and three-fourths.

There have apparently been no strong surface-markings : impressions of the exterior show striæ of growth, which are crowded and somewhat wrinkled on the inner margins of the curve.

Geological formation and locality. In limestone of the age of the Upper Helderberg group : near Milwaukie, Wisconsin.

GYROCERAS CYCLOPS (n. s.).

SHELL large, gradually tapering from the aperture : one or more volutions; section circular; siphuncle dorsal.

SURFACE lamellose striate, and at intervals projected in strong foliate expansions, which are plicated towards their periphery.

In a specimen making nearly one volution, and measuring on the dorsal curve sixteen inches, the dorso-ventral diameter is about three inches at the mouth, and about one inch at the other extremity. The greatest diameter, from the exterior sides of the curve, is about eight inches.

A far as can be ascertained, the siphuncle is dorsal. The septa are obscure, and have not been clearly observed within less than an inch of each other. Below the last chamber there are two septa, or a thickened septum, making a thickness of an eighth of an inch ; and at an interval of a little more than an inch, another similar feature, and a third at an inch below the second. The strong lamellose extensions are about an inch asunder where the diameter of the shell is two inches, and these make a retral curve upon the back of the shell.

In a fragment of this species given to me by Prof. ANDREWS of Marietta, Ohio, the foliate expansions extend an inch beyond the plane of the surface of the shell, are strongly plicated upon the distal half of their width, and closely marked by concentric lamellose striæ. The larger specimen described is from the Cabinet of the Albany Institute.

Geological formation and locality. In limestone of the Upper Helderberg group : Helderberg mountains; and near Columbus, Ohio.

GYROCERAS NAIS (n. s.).

SHELL consisting of two or more volutions, which are somewhat rapidly expanded from the apex towards the aperture. Volutions subangular in the middle of the sides, rounded on the back, with

the dorsum a little elevated and sloping abruptly on the umbilical side.

The umbilical slopes of the volution are marked by strong rounded transverse striæ, which are sometimes bifurcated towards the side of the shell, and are crossed by a few revolving depressed lines. The back of the shell is conspicuously marked by flattened revolving bands, which are crossed by less conspicuous transverse striæ. The dorsum is marked by a narrow depressed band, on which the striæ make an abrupt retral bend, indicating the sinuosity in the margin of the aperture. About halfway from the dorsal line to the angular sides of the volution, commence low elevations, which become strong oblique ridges or elongate nodes; which are limited by the angular margin of the volutions, and do not pass to the ventral region.

The specimen examined preserves about one and a half volutions, is imperfect towards the aperture, and the apex is broken off : it has had a diameter of about two inches.

This is a strongly marked species, and readily distinguished from any other known to me in the upper members of the New-York series.

Geological formation and locality. In the shales of the Chemung group· Chemung county, N.Y.

GYROCERAS (CYRTOCERAS?) SPINOSUM.

Phragmoceras spinosum : CONRAD, Ann. Rep. Palæontology New-York, 1840, p. 206.

" SHELL with two rows of foliated spines."

This species is cited by Mr. CONRAD from the Schoharie grit. A fossil which I suppose to have been the one described by Mr. CONRAD, has the form and aspect of a CYRTOCERAS with the smaller extremity broken off; and though I have not seen an entire specimen, or one making a full volution, yet I have little doubt, from the curvature and the proportions of the parts, that it has more than one volution. The shell gradually enlarges towards the aperture, which is not expanded beyond the general proportions of the shell below. The section is broadly elliptical; the greatest diameter, in the dorso-ventral direction. Measured on the side of the shell, there are about six chambers in the length of the greatest diameter. Siphuncle subcentral. Surface with strong lamellose transverse striæ, which, on the ventral side and perhaps on other parts, are raised in undulating low bands or ridges. There are two rows of lamellose nodes or "foliated spines" on each side, formed by the extension of the shell in short retral arches.

Geological formation and locality. In Schoharie grit : Schoharie and the Helderberg mountains; and in the same rock in Ulster county, N.Y. 1861.]

GENUS CYRTOCERAS (Goldfuss).

CYRTOCERAS EUGENIUM (n. s.).

Shell elongate : the first five or six inches from the aperture make a curve of not more than half an inch. A specimen of medium size measures along the outside of the curve a little more than seven inches, and it may have been an inch longer when entire. The transverse diameter is greater than the dorso-ventral diameter; being as six to five at the smaller end, and in the same proportion at an inch below the aperture, namely, one inch and a half to one inch and a quarter. At the smaller extremity, the divergence from a straight line along the body of the shell is less than three inches, and the diameter indicates a curvature of not more than a quarter of a circle.

A larger specimen, where the straight portion of the shell has a length of six inches, and the smaller extremity (where broken off) has a diameter of an inch; the dorso-ventral diameter, at the aperture, is one inch and a quarter, and the transverse diameter is a little more than one inch and five-eighths : it has the same diameter at a point two inches beyond the aperture, while the intermediate space is slightly enlarged. On the outside of the curve, the septa are distant very nearly one-fourth the dorso-ventral diameter. The siphuncle is upon the outer side of the curve, and close to the shell.

The surface is marked by transverse elevated or sublamellose lines of growth; and at intervals corresponding to the septa, are strong lamellose ridges, the effects of which are shown upon the cast in distinct concentric ridges which are bent abruptly downwards on the back of the shell : these ridges become less prominent on approaching the aperture; but the bending of the striæ continues the same, and the margin of the aperture shows a sinuosity of a quarter of an inch in depth by nearly half an inch in width.

This is a remarkable and well-marked species, and may be known even in fragments by the form and proportional distance of the arching transverse ridges, which resemble those of *Gyroceras matheri*, but are twice as numerous in equal space.

Geological formation and locality. In the Schoharie grit at Schoharie, and in the Helderberg mountains.

CYRTOCERAS JASON (n. s.).

Shell large and strong: outer chamber very deep, uniformly expanding towards the aperture; section somewhat obtusely hexagonal, the septate portion round.

A fragment of the outer chamber, which shows no evidence of septa throughout its entire extent, measures nine inches in length and about three inches in the dorso-ventral diameter; the middle of the side, for a width of nearly an inch and a half, is flattened or depressed convex, and limited by very obtuse or rounded angles: another similar flattened space occupies the ventral slope, and a narrower one the dorsal slope; the ventrum is likewise flattened. The surface is strongly lamellose-striate, and, at irregular intervals, is projected from the sides in lamelliform rings which are deeply sinuate and thickened upon the obtuse angles: there is apparently a row of these upon the dorsum; but this cannot be satisfactorily determined, in consequence of adhering stone. In a length of six inches, there are thirteen of these lamellose extensions.

A fragment of the septate portion of a specimen, measuring seven inches in length, is two inches in diameter, and has three chambers in the space of an inch. The outer chamber, of nine inches in length, has a deviation from a straight line of one inch; and the septate fragment of seven inches has a deviation of about three inches.

In surface-characters, this species bears some resemblance to *Gyroceras* (*Cyrtoceras*) *spinosum;* but in that one the striæ between the rows of spiniform processes are more undulatory, and, on the ventral side, are regularly undulating, the retral curve being depressed so that the surface is marked by low revolving bands. In a specimen of that species seven inches long, and preserving part of the outer chamber, the curve or deviation from a right line parallel with the outer chamber is five inches and a half.

Geological formation and locality. In the Schoharie grit: Schoharie.

CYRTOCERAS MORSUM (n. s.).

A small species in the limestone, with a length of a little more than two inches, has a diameter of a quarter of an inch at the smaller imperfect extremity, and a little over half an inch at the larger extremity: section circular. Surface marked by fine transverse striæ, which are aggregated in gently swelling ridges apparently corresponding to the septa.

The specimen is too imperfect to be fully characterized.

Geological formation and locality. In limestone of the Upper Helderberg group at Clarence-hollow, Erie county, N.Y.

CYRTOCERAS METULA (n. s.).

This species is very gradually curving; the specimen examined making, in a length of two inches, less than one-eighth of one volution. The smaller extremity of the fragment has a diameter of three-eighths of an inch; and the larger extremity, which is at the commencement of the outer chamber, has a dorso-ventral diameter of three-fourths of an inch, while the transverse diameter is nearly an inch. The septa are numerous, and about a line distant from each other on the middle of the specimen.

This specimen contrasts strongly with the preceding in its proportions, and may be readily distinguished by its much more rapid expansion towards the aperture.

Geological formation and locality. In limestone of the Upper Helderberg group at Clarence-hollow, associated with the preceding species.

GENUS APLOCERAS (D'ORBIGNY).

APLOCERAS (CYRTOCERAS) LIRATUM (n. s.).

A fragment, clearly appertaining to this genus of D'ORBIGNY, has been found in the Goniatite limestone. The specimen preserves three or four of the septa and a part of the outer chamber: the section is circular; the septa are distant a little more than an eighth of an inch. The surface is longitudinally fluted by regular ridges, as in the typical species of the genus.

Geological formation and locality. In the Goniatite limestone at Manlius, Onondaga county, N.Y.

GENUS GOMPHOCERAS (SOWERBY).

GOMPHOCERAS BETA (n. s.).

A small species, attaining the length of about an inch and a half. The form is ovoid; the seven or eight chambers before the last measuring about three-fourths of an inch, and the outer chamber as much more. The greatest diameter, when not compressed, is nearly half as great as the length. The septa are thick, and the siphuncle marginal.

Geological formation and locality. In the Schoharie grit at Schoharie.

GENUS ORTHOCERAS (Breyn).

ORTHOCERAS PELOPS (n. s.).

Shell robust, somewhat rapidly tapering : section circular; siphuncle central.

This species is known to me only in the condition of casts of the interior. Specimens are rarely found with a length of two feet, but always imperfect. The outer chamber is very long and large. A fragment of the septate portion seven inches long, the proportions of which are pretty well preserved, has a diameter of two inches at the larger and one inch at the smaller extremity. In a specimen 1·75 diameter at the larger end, three chambers measure 1·57 inches; and in a specimen four inches long, with a diameter of one inch at the smaller extremity, there are thirteen chambers. In a fragment where the smaller extremity is less than half an inch, there are twenty septa in a length of three and a quarter inches.

There are some variations in the proportions between the parts, and the number of septa in the same space, with an equal diameter. The siphuncle is small; being scarcely more than three-twentieths of an inch in diameter, and not more than half this diameter in some of the smaller specimens.

This is the common and abundant species of the Schoharie grit; but it is extremely difficult to find any but fragmentary specimens.

Geological formation and locality. In the Schoharie grit at the Helderberg mountains and Schoharie.

ORTHOCERAS TETRICUM (n. s.).

In the more calcareous beds of the Schoharie grit, there is a species of Orthoceras of a more gradually tapering form. The siphuncle is comparatively large and a little excentric : the septa, where the diameter of the shell is an inch and a half, are half an inch distant, or nine in the length of five inches and a half where the diameter at the smaller end is one inch. The distance of the septa is about double those of the preceding species, while it differs from the *O. longicameratum* of the Lower Helderberg group in the lesser comparative distance of the septa.

Geological formation and locality. In the calcareous part of the Schoharie grit : in the Helderberg mountains.

ORTHOCERAS FOLIATUM (n. s.).

SHELL elongate, very gradually tapering: septa comparatively distant; siphuncle unknown.

SURFACE marked by fine concentric striæ, and, at intervals corresponding with the septa, the shell extends in lamelliform expansions at nearly right angles to the axis, or inclined a little towards the aperture: these lamelliform expansions are gently curved downwards on the back of the shell, and abruptly bent on the dorsal line, leaving a sinuosity in the margin of the aperture.

A specimen, of which the shell only is preserved in the stone, measures more than seven and a half inches; and in this space are twenty-two projecting ridges, some of which extend more than a quarter of an inch beyond the body of the shell: in the middle there are about three of these ridges, or a little less, in the space of an inch; but at the larger extremity, or towards the aperture, they are more crowded, giving five in the space of an inch. In another specimen, three spaces occupy an inch and a quarter; and in a cast of the interior, they present about the same proportions.

This species is not uncommon in fragments or impressions of the exterior; and the similarity of these impressions to those of *Cyrtoceras eugenium* suggests a relation between the two, but in this one the strong annulations continue almost to the aperture, while in that species they do not. If this be a CYRTOCERAS, it bears nevertheless an undeviating straight line for at least eight inches.

Geological formation and locality. In the Schoharie grit: Helderberg mountains, and Schoharie.

ORTHOCERAS BACULUM (n. s.).

SHELL cylindrical, scarcely tapering: outer chamber very long; septa somewhat deeply concave, distant more than one-third the diameter of the shell. Siphuncle excentric. Surface unknown.

This species is remarkable for its slender cylindrical form. A specimen five and a half inches long, and preserving more than three inches of the outer chamber, is scarcely appreciably diminished towards the apex, the greatest actual diameter being in the middle of the length. Another fragment of nearly four inches in length, of which an inch and a half pertains to the outer chamber, shows scarcely a diminution in the diameter. The first of these specimens has a diameter of five-eighths of an inch, and the second, of half

an inch. A still larger fragment has a diameter of seven-eighths of an inch.

This species is readily distinguished from any other known to me in the whole series, by its slender and almost cylindrical form.

Geological formation and locality. In the Schoharie grit at Schoharie.

ORTHOCERAS THOAS (n. s.).

Shell cylindrical, very gradually tapering towards the apex : outer chamber deep; septa very concave, the concavity exceeding the distance between them. Siphuncle small, central.

Surface annulated by strong direct ridges just above (or on the apicial side) of each septum ; longitudinally striated by coarse rounded striæ, which are distant from each other nearly twice their width : these striæ are usually rigid, but sometimes undulated.

Nearly all the specimens are a little flattened from compression, the greatest diameter being in the direction of the laminæ of the rock. A specimen one inch in diameter between the annulations measures about one-eighth of an inch more across the annulations. The distance of the annulations is not always uniform : in two specimens of nearly the same size, one has nine annulations in the space where the other has eight. In a specimen of an inch in diameter, the siphuncle measures a little over three-twentieths of an inch.

The ridges or annulations are direct, and, in this character, differs from the Niagara species, while the longitudinal striæ constitute another distinctive feature. This fossil is less tapering than the annulated species in the Hamilton group.

Geological formation and locality. In the Schoharie grit : at Schoharie and the Helderberg mountains.

ORTHOCERAS HYAS (n. s.).

A fragment in the same association as the preceding has a slightly smaller central siphuncle and less concave and more closely arranged septa, there being four in the space occupied by three in the former. The annulations are a little more abruptly elevated than in *O. thoas*, and are direct across the middle of the chamber, or equidistant between the septa.

I have been unable to discover striæ of any kind, but the angular annulations between the septa are characteristic. The largest diameter of this specimen is one inch, and this length includes six annulations.

Geological formation and locality. In the Schoharie grit at Schoharie.

ORTHOCERAS MULTICINCTUM (n. s.).

SHELL cylindrical, very gradually enlarging from the apex : septa numerous; siphuncle small, central.

SURFACE annulated by numerous narrow ridges, the spaces between which are equal to once and a half or twice the diameter of the annulations : remains of longitudinal striæ are preserved on a part of the surface.

A specimen somewhat compressed, but which has had a diameter of about three-fourths of an inch, has thirteen annulations in the length of an inch; and at an inch nearer the apex, has fifteen annulations in the length of an inch. In the same specimen, however, the length of an inch from the aperture embraces only eight annulations. In a specimen measuring three-eighths of an inch in diameter, there are fifteen annulations in the length of half an inch.

From this great variation in the distance of the annulations, it might appear that this form is only a variety of *O. thoas;* but in numerous specimens of that species, having a diameter only one quarter greater than the largest individual of this species, the annulations show only the variation noted in the description, and I am therefore induced to regard them as distinct species.

Geological formation and locality. In the Schoharie grit : Schoharie.

ORTHOCERAS PROFUNDUM (n. s.).

SHELL cylindrical, gradually tapering from the aperture : outer chamber very deep; siphuncle apparently a little excentric.

SURFACE longitudinally marked by sharp ridges, which, in specimens of one inch to one inch and a half in diameter, are distant about one-tenth of an inch, and annulated by sharp, rather distant striæ, giving to the longitudinal ridges an undulated or crenulate aspect. The spaces between the transverse striæ are about one quarter as great as between the longitudinal striæ, but often show finer striæ of growth, and sometimes the sharper annulating striæ are not conspicuous.

This species differs in surface-marking from *O. imbricatum* of the Niagara group, in the absence of intermediate finer longitudinal striæ; and from *O. virgatum*, in the more regular distribution of the longitudinal and stronger annulating striæ.

In two individuals of an inch and a half diameter, the portion of the outer chamber preserved is nearly six inches in depth.

Geological formation and locality. In limestone of the Upper Helderberg group: Williamsville, N.Y.

ORTHOCERAS SUBULATUM.

Orthoceras subulatum: HALL, Geol. Rep. 4th District New-York, 1843, p. 180, f. 1

This species, characteristic of the Marcellus shale, occurs in numerous localities, but usually in the form of casts. A single specimens from that rock, having the same proportions and flattened at the larger extremity, is finely cancellated by longitudinal undulating and transverse striæ, which, at their junction, produce a granulose or papillose surface. The transverse striæ are more crowded at regular intervals, and the surface is elevated in low ridges: this feature is slightly perceptible in the casts.

Geological formation and locality. In the Marcellus shale: Bloomfield; Avon; Schoharie, and elsewhere.

ORTHOCERAS CONSTRICTUM.

Orthoceras constrictum: VANUXEM, Geol. Report Third District of New-York, 1842, p. 152, f. 1.

This species is common in the coarser shales of the Hamilton group, east of Cayuga lake. The specimens are not often larger than the one figured by Mr. VANUXEM. The constriction occurs usually at a point one inch to one and a half inches below the last septum: this feature is sometimes as abrupt as represented in the figure cited.

The siphuncle is small, central or very nearly so; the septa comparatively close, and very convex. There are apparently no surface-markings, except fine transverse striæ.

A fragment where the diameter at the smaller end is a little less than half an inch, has ten chambers in the length of an inch; and another, of larger diameter, has nine chambers in the same length.

This species has a wide range. Specimens which do not differ in specific character from those in New-York, occur in Maryland.

Geological formation and locality. In the coarser shales of the Hamilton group: at Cazenovia, Hamilton, and elsewhere in New-York; and at Cumberland, Maryland.

ORTHOCERAS EXILE (n. s.).

SHELL elongate, cylindrical, very gradually tapering, broadly and gently constricted near the aperture, and swelling between that point and the commencement of the septa : aperture a little expanded; septa distant, somewhat less than one-third the diameter, very convex. Siphuncle small, a little excentric.

SURFACE transversely striate.

This fossil is often mistaken for the *O. constrictum;* but if we are to take the figure of Mr. VANUXEM, with the abrupt constriction and closely arranged septa, that name is applicable to the preceding species. In the present one the constriction is always gentle, and often extends over the space of three-fourths of an inch; the septa are much more distant, and the siphuncle larger and always excentric.

A specimen of this species, measuring nearly six inches long, has a length of the outer chamber of two inches, and a diameter, when not compressed, of about half an inch. In the first inch from the outer chamber, the septate portion has six chambers (not counting the narrow space next the outer cavity); the second inch has seven chambers, and the third has nine. A specimen from Cumberland (Maryland), with essentially the same characters, has five chambers in the length of an inch where the diameter is five-eighths of an inch. In numerous specimens of about the same proportions and character, the siphuncle is excentric.

Geological formation and locality. In the coarser shales of the Hamilton group at Cazenovia (New-York), and near Cumberland (Maryland).

ORTHOCERAS CROTALUM (n. s.).

SHELL cylindrical, somewhat rapidly attenuate : septa numerous, moderately convex. Siphuncle central or subcentral.

SURFACE marked by strong annulations, which are a little undulating or bent backwards on one side, so as not to correspond with the line of the septa : these are crossed by fine even longitudinal striæ, which are sometimes slightly undulated in passing over the annulations.

A specimen of a little more than half an inch in diameter, has seven or eight septa in the length of an inch. The annulations cross the shell in such a manner that nearly one half the circumference is upon one division or chamber, and a little more than half the circumference on the next lower one, and sometimes slightly affecting the next one below this. One, two, or three narrow chambers occur at the beginning of the septate portion, or

adjacent to the outer chamber. A fragment two inches long and nearly three-fourths of an inch in diameter at the larger end, and less than half an inch at the smaller end, has somewhat more than eight annulations.

Geological formation and locality. In the soft shales of the Hamilton group : on the shore of Seneca lake, and at Ludlowville on Cayuga lake; and in the coarser shales at Cazenovia, Hamilton, and other places in New-York.

ORTHOCERAS NUNTIUM (n. s.).

SHELL somewhat slender, very gradually tapering from the outer chamber : septa convex, the convexity nearly equal to twice the distance between the septa; siphuncle small, central.

SURFACE annulated by about one annulation to each septum; and the fine thread-like longitudinal striæ are crossed by fainter transverse striæ, which are more conspicuous near the aperture, but often scarcely visible on well-preserved specimens.

A specimen a little less than half an inch in diameter at the larger end, has sixteen annulations in the length of an inch and a half. Two other specimens, of about half an inch in diameter, have nine or ten annulations in the length of an inch. A specimen a quarter of an inch in diameter at the smaller end, has over thirteen annulations in the length of an inch. The annulations are slightly oblique to the axis; but in a well-marked specimen, are limited to a single division, being on one side at the upper margin, and on the opposite side at the lower margin of the chamber, making the obliquity equal the distance between two septa.

This species is less rapidly attenuate than the preceding; the annulations sharper, and twice as numerous on specimens of the same size. The numerous annulations, and their relations to the septa, are distinctive characters. The shell tapers less rapidly than *O. crotalum.*

This and the preceding species bear a very close relation to *O. ibex* (SOWERBY), or *O. ibex* and *O. articulatum* as united; but I am unable to identify them satisfactorily.

Geological formation and locality. In the soft shales of the Hamilton group : on the shores of Seneca lake; and in the coarser shales east of Cayuga lake.

ORTHOCERAS PERELEGANS?

Compare *Orthoceras perelegans* : SALTER, Memoirs of the Geol. Survey of Great Britain, Vol. ii, part i, pag. 354, pl. 13, f. 2, 3, 4.

SHELL cylindrical, gradually tapering : siphuncle central.

SURFACE undulated by rounded, subundulating or slightly oblique ridges, and marked by fine striæ of growth which are essentially parallel to the annulations; without longitudinal striæ.

I have seen but a single fragment of this species, from the Hamilton group : it differs conspicuously from the preceding species, in the absence of longitudinal striæ, and usually in the more numerous annulations in the same space. Without more specimens, I have not the means of finding any specific difference between this and the species of Mr. SALTER.

Geological formation and locality. In the coarse shales of the Hamilton group : near Hamilton, Madison county, N.Y

ORTHOCERAS ÆGEA (n. s.).

SHELL cylindrical, gradually tapering : septa distant, very convex; siphuncle central?

SURFACE undulated by broad undefined annulations, crossed by prominent longitudinal rounded striæ, which are distant from each other, with a fainter one between. Transverse striæ obscure in the specimen examined.

This species differs from *O. profundum* of the Upper Helderberg limestone, in its surface-markings, in the rounded character of the longitudinal striæ, and in the presence of the intermediate finer striæ : the broad undefined annulations are also a marked feature, though this may not be constant in all parts of the shell.

Geological formation and locality. In the calcareous beds of the Hamilton group in Madison county, N.Y.

SUPPLEMENTARY NOTE

TO PAGES 95 AND 96 OF THE THIRTEENTH ANNUAL REPORT OF THE REGENTS ON THE STATE CABINET.

During the studies and comparisons of the fossils described in the preceding pages, I have discovered among my collections from Licking county (Ohio) a specimen of the *Goniatites hyas*, which I have described from Rockford (Indiana). This specimen is from the yellow sandstones and olive shale and sandstone group known as the Waverly sandstone series of Ohio, and which is the equivalent or continuation of the Portage and Chemung groups of New-York. From the usually limited vertical range of Goniatites in our strata, the occurrence of this fossil in such a position induces me to conclude that the position assigned to the Goniatite beds of Rockford may be erroneous, and that the true position is higher in the series, or more nearly in a parallel with the Chemung group; for I can hardly suppose that a species of Goniatite common in beds of the age of the Hamilton group would range so high as the Chemung group.

The similarity of one or two of these Goniatites with Carboniferous forms of Europe renders the question regarding the position of the Goniatite beds of Rockford a matter of much interest; and during the Geological Survey of Iowa, I directed Mr. Worthen, then connected with that survey, to make a section across the country, taking the locality of these beds in his way, with a view of determining their true position. He however failed to obtain an actual section from exposures of the strata at the locality; but his observations elsewhere, in connexion with those made by myself, compelled me to the conclusion that the Rockford beds were below the sandstones, which, in the Ohio and farther west, were regarded as the continuation of the Chemung group.

I am satisfied, from my own observations in other localities, that the Goniatite beds of Rockford are associated with, or lie directly above the Black slate; and that this Black slate, on the Ohio river, apparently succeeds in direct sequence the limestone which is clearly a continuation of the Upper Helderberg limestone of New-York. As the Hamilton group has not been recognized in the south part of Ohio or Indiana, so far as I know, there may yet be room for doubt as to whether this group thins out beneath the black shale or above it; or, in other words, whether the Black shale of Southern Ohio and Indiana, and of Kentucky and Tennessee, may be the continuation of the Marcellus shale or the Genesee slate of New-York. For, as I have said elsewhere*, this rock, "from position, seems to be the equivalent of the Marcellus shale of New-York, and is the only representative of that rock, the Hamilton group, and the Genesee slate; for we pass directly from this to the green shales or slaty sandstones of the Portage group or Waverly sandstones of Ohio."

The discovery of this Goniatite in the latter series of Ohio suggests anew the question regarding the age of the black slate near the Falls of the Ohio.

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* Transactions of the Am. Assoc. of Geologists and Naturalists, 1841 & 1842, p. 280.

PRELIMINARY NOTICE

OF THE

TRILOBITES AND OTHER CRUSTACEA OF THE UPPER HELDERBERG, HAMILTON AND CHEMUNG GROUPS.

[Published September 1861.]

The Trilobites were among the fossils which early attracted the attention of American and other naturalists; and specimens had been sent by Prof. Ducatel of Maryland and Dr. Hosack of New-York to Prof. Brongniart at Paris, and were in his hands when he published his "*Histoire Naturelle des Crustacés fossiles.*" Among those who have described trilobites from the rocks of the United States, and particularly from New-York, or species known in this State, are Mr. Stokes, Dr. Bigsby, Dr. De Kay, Dr. Jacob Green*, and Prof. A. Eaton. During the Geological Survey of this State, Mr. Conrad described several species in his annual reports upon the palæontology; and others have been published in the first, second and third volumes of the Palæontology of New-York, embracing those known in the Lower and Upper Silurian strata. The following species are all that are at present known to me in the higher groups, or the rocks corresponding to the Devonian System of Europe.

TRILOBITES.

GENUS CALYMENE (Brongniart).

CALYMENE PLATYS (Green).

Calymene platys : Green, Monograph, p. 32.

This species was described by Dr. Green from a cast taken in a natural mould left by the fossil in the rock, which is its more common mode of occurrence. Since that time, two or three specimens of the fossil, retaining portions of the crust, have been found at Schoharie by Mr. Gebhard, and are now in the State Cabinet.

The form is similar to *C. blumenbachii;* but certain differences, and particularly the form of the hypostoma, distinguish it from that species.

Geological formation and locality. In the Schoharie grit : in the Helderberg mountains, and at Schoharie.

* Monograph of the Trilobites of North America, with colored models of the species By Jacob Green, M.D. etc. 1832.

GENUS DALMANIA (EMMRICH).

DALMANIA ANCHIOPS (GREEN, sp.).

Calymene : Cited with doubt by BRONGNIART as *C. macrophthalma* (Crus. fos. p. 16).
Calymene anchiops : GREEN, Monograph, p. 35.
Asaphus laticostatus : GREEN, Ibid. p. 40.
Phacops anchiops : HALL, in Foster & Whitney's Report of Lake Superior, p. 124*.

This species, in the condition of fragments and casts, is not unfrequent in the Schoharie grit of New-York. The original specimen is a partial cast of the interior of the crust : the crust is removed from the greater part of the head and mainly from the axis, presenting but a narrow border on the lower margin, and no portion of the surface is entire. The axis is a little more than half as wide as the lateral lobes : in the caudal portion, it has about thirteen rings; and the lateral lobes have nine ribs, the last one parallel to the axis. The frontal lobe of the glabella is wide across the middle, somewhat narrowed and almost pointed anteriorly, and abruptly contracted in front of the eyes.

In the specimens, which are all casts, the anterior and middle lobes appear as a single prominence, and the posterior lobe is very obscure. Sharp indentations mark the longitudinal furrow. The border of the head is prolonged posteriorly into spines; and, although not positively determinable in the specimens before me, it seems probable that the anterior border has been produced, either as an acute extension, or as a distinct process in front, while the centre of the occipital ring is produced into a short spine. These characters, however, are not visible in the original specimen.

In a small entire caudal shield there is a posterior spine of full one quarter of an inch : the rings of the axis, and the lateral ribs in this one are tuberculated. The caudal shield of the original fossil measures about one inch and three-fourths across the anterior margin, with a length of about one inch. In an impression in the stone, and still retaining part of the crust, and a little larger than the original specimen, the length of the caudal spine is five-eighths of an inch. Casts of the caudal shield, measuring from two and a half to three inches, are not uncommon in the Schoharie grit; and it is one of these, which is the typical specimen of GREEN's *Asaphus laticostatus*.

The plaster cast of *A. laticostatus*, referred to in GREEN's Monograph, measures a little more than three inches in diameter, and is nearly two inches and a quarter in length.

Geological formation and locality. In the Schoharie grit at Schoharie, and in the Helderberg mountains.

* At the time of writing for that Report, I had not seen the generic description of DALMANIA : these forms have been previously united under PHACOPS.

DALMANIA ANCHIOPS, *var.* ARMATA.

Among the specimens in the State Collection from Schoharie, there is a portion of the head of a Trilobite resembling the *Dalmania anchiops.* The diameter across the base has been fully three inches : the occipital ring bears a strong rounded spine, which has been an inch and a quarter long ; and the transverse diameter, at its junction with the annulation, is half an inch.

In a well-marked head of *D. anchiops*, more than two inches in diameter, the occipital spine is less than a quarter of an inch.

For the present, I propose to indicate the form with the strong spine as a variety, *D. armata.*

Geological formation and locality. In the Schoharie grit : Schoharie.

DALMANIA SELENURUS.

Asaphus selenurus : EATON, Geol. Textbook, 1832.
Calymene? odontocephala : GREEN, Supp. to Monograph, etc. p. 9.
Odontocephalus selenurus : CONRAD, Ann. Rep. Palæontology N.York, 1840, p. 204.
— — : VANUXEM, Geol. Report Third District New-York, 1842, pp. 139 & 140, f. 1.
— — : HALL, Geol. Rep. Fourth District New-York, 1843.
Dalmania selenurus : HALL, Corrected List of Fossils, Twelfth Annual Report of Regents on the State Cabinet, p. 88.

This species, originally described by Prof. EATON from a specimen of the caudal shield, is regarded as a characteristic species of the Corniferous limestone of the Helderberg mountains. The caudal extremity is produced into two short spines, leaving the posterior margin crescentiform, whence its name. At the time of the original description of the species, the head had not been determined. Dr. GREEN, however, obtained a separate head, which he described under the name of *Calymene odontocephala.* Subsequently, in 1840, Mr. CONRAD saw an entire specimen from Auburn, showing that the head and tail, which had been referred to different genera and species, were in reality parts of the same trilobite. Since that period, several entire specimens have been obtained, and the species is supposed to be well known.

In the examination of the specimens usually referred to *D. selenurus*, I find some characters incompatible with a single species.

The original description was founded on specimens of the caudal shield obtained in the Helderberg mountains and at Schoharie ; and in examining authentic specimens, I find the anterior border of individuals from these localities to be margined by ten toothlike processes forming a fimbriated or denticulated edge, from which the name *Odontocephalus* was suggested. These apparent denticulations are produced by oval indentations or perforations through a wide frontal border ; and though they appear separated,

they may perhaps sometimes be united at their outer extremities. In the Helderberg species these processes are strong, and much expanded at the outer extremities, and the posterior angle of the border but little produced. The frontal lobe of the glabella is broad and strong, having a transverse diameter of about once and a half the length. The eyes are very prominent, of medium size, with six and sometimes seven lenses in the vertical line and ten or eleven in the diagonal line. The caudal shield in well-preserved individuals shows ten or eleven rings, and sometimes a faint indication of another : the lateral lobes show ten ribs terminating in a wide border, which is marked by the furrows turning abruptly backwards at the end of the ribs. The last rib is short, and directed obliquely outwards from a little above the base of the axis, dying out in the wide posterior border, which is truncated or slightly concave in the centre, and the lateral angles produced into rounded spines sometimes a quarter of an inch in length.

This species is sometimes four inches or more long, and somewhat more than two inches wide. In a specimen four inches in length, the caudal shield, including the spine, is one inch and a quarter long, and one inch and three quarters at the anterior margin : the axis of the same specimen is three-fourths of an inch in its widest part, and the width of the glabella at its base is half an inch.

Geological formation and locality. In the Corniferous limestone of the Upper Helderberg group in the Helderberg mountains; at Schoharie, and Auburn, N.Y.

DALMANIA ÆGERIA (n. s.).

SHELL semielliptical : whole length nearly twice the width; the length from the occipital ring to the anterior margin, a little greater than half the width; the border, at the posterior angles, produced into elongate slender spine-like processes, and anteriorly it is fringed by eleven processes, a central one and five on each side. Frontal lobe of the glabella subrhomboidal, a little extended in the middle in front, the lateral extension being scarcely as far as a vertical line drawn through the middle of the eye. The first and second lateral lobes are nearly equal, the last one smaller : the occipital furrow is strongly marked. The axis is about half as wide as the lateral lobes, and moderately prominent. The lateral lobes are flat for about half their width, and bend abruptly downwards at the sides.

The caudal shield is nearly as long as the head; the axis marked by twelve or thirteen rings, and thirteen or fourteen are visible in the cast; the lateral lobes have eleven distinct ribs, and one

or two indistinct ones which are parallel to the axis. The ... beyond the axis is flattened and spreading, concave on the posterior margin, and the angles slightly produced in flattened spiniform processes. Surface granulose.

This species differs from the *D. selenurus*, in the form and proportions of the head; the prolongation of the posterior angles of the border of the buckler, which reaches sometimes to the fifth articulation of the body; the greater extension of the fringed border, and the more pointed form in front. The fringe-like appendages are more in number, and are separated by narrower spaces: in the caudal shield, there are a larger number of rings on the axis; but the most distinctive features of this part of the crust are the direction of the ribs in the lateral lobes, and the wide concave posterior margin with scarcely extended spines.

In one nearly entire specimen; in two separated heads; and several caudal shields, the above described characters are constant; and these specimens, with a single exception, are all from the western part of the State.

Geological formation and locality. In the limestone of the Upper Helderberg group: at Williamsville and Clarence-hollow, and at Chittenango, New-York.

DALMANIA CORONATA (n. s.).

ENTIRE BODY subelliptical: length and width nearly as two to three, moderately convex; the apex rounded and rising gently above the lateral lobes, which are flattened for more than half their width. Head lunate, the length less than half its width. The posterior angles of the border not produced: anterior border ornamented with nine short tooth-like processes; a central one, and four on each side. Frontal lobe of the glabella short and wide: anterior and middle lobes nearly equal, the dividing furrow marked only at the side of the axis; posterior lobe short and well defined towards the axis; occipital furrow narrow; occipital ring wide and strong. Eyes small, prominent, with about five lenses in the vertical rows.

The axis of the thorax is but little narrower than the lateral lobes; the annulations somewhat flattened, and spreading towards the extremities. The lateral lobes are flattened or a little concave towards the axis, and, in their natural position, are bent abruptly from the middle towards the exterior margins. The pygidium is somewhat semicircular, emarginate, and a little concave behind: the width, in a somewhat flattened specimen, is a little more than

twice the length. Eight distinct rings mark the axis, with two or three indistinct ones below : the posterior extremity is rounded and obtuse, and separated from the expanded border by a marked groove. The lateral lobes are marked by ten ribs, which terminate in a moderately wide border. The grooves between the ribs are rounded, well defined, and wider at their abrupt termination on the border. The posterior border is obtusely angular on the margin in the direction of the rib next to the last on each side, and a little concave on the exterior between these points, and appearing as if bent upwards, having a slightly arching contour when viewed in profile from behind.

This species resembles the *D. selenurus* and *D. ægeria;* but the head is less extended in front, the denticulations are shorter, and apparently but nine in number ; and the caudal extremity is broadly emarginate or slightly concave, but has no spiniform processes. There are other minor distinctions, which will be shown in final illustrations.

Geological formation and locality. In the Hamilton group : near Skeneateles lake, N.Y.

DALMANIA MACROPS (n. s.).

HEAD short, lunate : frontal lobe of glabella very wide, nearly twice as wide as long; anterior and middle lobes nearly equal; posterior lobe small; occipital ring large. Eyes proportionally very large; the elevation of the one measured being $\frac{35}{100}$ of an inch, the longitudinal diameter at base $\frac{40}{100}$, and at summit $\frac{30}{100}$. There are sixteen or more lenses in a vertical line ; thirty-four ranges can be counted, and there are apparently one or two more : the lenses are prominent, and their area not limited by elevated lines.

The only specimen positively determined to belong to this species, is an imperfect head : this is distinguished from *D. selenurus* and *D. ægeria* by the broader frontal lobe of the glabella, and proportionally much larger eye ; it differs from *D. adspectans* in the broader base and less elevation of the eye, and the larger and more prominent lenses.

Geological formation and locality. In limestone of the Upper Helderberg group : Schoharie.

DALMANIA ADSPECTANS.

Asaphus adspectans : CONRAD, Annual Report Palæontology of New-York, 1841, pa. 49, pl. 1, f. 9.

DESCRIPTION. "A small portion of the buckler and one eye only is "visible; but the eye is of an extraordinary height, the margins "parallel, and the lenses arranged in parallel longitudinal lines, "small and very numerous."

The eye of this trilobite is remarkably elevated and subcylindrical, measuring $\frac{40}{100}$ of an inch in height, $\frac{30}{100}$ in diameter at the base, and $\frac{20}{100}$ at the summit. Lenses very small, depressed, and surrounded by an elevated line enclosing a hexagonal area. There are twenty-two lenses in a vertical line from base to top, and as many as thirty rows can be counted in one specimen : in another specimen the eye is a little smaller, and has twenty or twenty-one ranges of lenses in a vertical line. The portion of cheek remaining is strongly tuberculated.

Geological formation and locality. In the limestone of the Upper Helderberg group : Schoharie and the Helderberg mountains.

DALMANIA MYRMECOPHORUS (GREEN, sp.).

Asaphus myrmecophorus : GREEN, in Amer. Jour. Sci. and Arts; and Supplement to Monograph of Trilobites, p. 16.

The specimen from which Professor GREEN described this species was a fragment of the pygidium, preserving "thirteen costal arches and fourteen joints of the middle lobe." So far as I am aware, no entire specimen has ever been found; and all the fragments yet positively identified with this species consist of parts, or nearly entire specimens of the pygidium. In one specimen about three inches in length, twenty-four annulations can be counted in the axis, and probably there were one or two more; and in the same specimen, twenty ribs may be counted in the lateral lobes. At the anterior extremity, the axis is a little more than one-third as wide as the lateral lobe. In one specimen, the width of the axis at the anterior border of the pygidium is one inch and a quarter in diameter, and the lateral lobe is more than three inches wide : when entire, the specimen must have been nearly eight inches wide.

The contour of the pygidium is moderately convex, the axis rising but little above the convexity of the lateral lobes : these are concave towards the axis; but within a distance of half the width of the axis from the dorsal furrow they acquire their greatest convexity (which is increased by a row of nodes), and slope with a gradual curve to near the margin, when they become a little concave from the slight bending upwards of the margin. The rings of the axis are strong, convex, and marked each by three spines. The ribs are simple, gradually expanding towards the margin, and

marked by an interrupted row of nodes, and sometimes by two unequal rows of nodes : in the perfect crust, these nodes may have been produced into spines. The border is narrowly thickened, sinuate on the margin, and, at the extremities of the ribs, is produced into long slender curving spines. Margin of the caudal extremity concave.

From the dimensions of the pygidium, this species has been by far the largest trilobite in the higher rocks of our system.

Geological formation and locality. In the limestone of the Upper Helderberg group : in the Helderberg mountains ; Schoharie ; and in Genesee county, N.Y.

DALMANIA HELENA (n. s.)

Pygidium large, subtriangular, depressed-convex, the axis little elevated, the posterior extremity bending upwards, and the border concave or emarginate : the axis tapers gradually; its width at the anterior end is equal to half the width of the lateral lobes, marked by twenty-one or twenty-two annulations (some of the posterior ones being perceptible in the cast). Lateral lobes marked by eighteen or nineteen ribs, which terminate in a narrow, thickened, somewhat undulating border.

Surface granulose; the ribs marked by two rows of nodes or short spines.

The description of this species was prepared for the press before I had had an opportunity of seeing anything more than fragments of the *D. myrmecophorus*, and the similarity between the two is very marked ; but unless that one is subject to extreme variations, this is a distinct species. The length and width of the pygidium are about as two to three, while in *D. myrmecophorus* the width is twice the length : the width of the axis in that species is a little more than one-third the width of the lateral lobe ; and in this one, the axis measures half the width of the lateral lobe.

Geological formation and locality. In limestone of the Upper Helderberg group : near Columbus (Ohio), and in New-York.

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DALMANIA CALYPSO (n. s.)

Pygidium paraboloid, very convex, the axis sharply angular : annulations about fifteen or sixteen (the posterior ones visible in the cast), surmounted by a row of short spines. Lateral lobes marked by twelve or thirteen gently curving narrow ribs, which terminate in a well defined border of moderate width. Length of specimen one inch : width across the anterior margin, nearly one inch and three-eighths.

This species is well characterized by the convexity of the pygidium, and angular axis with the crest of short spines.

Geological formation and locality. In limestone of the Upper Helderberg group : Falls of Ohio, in Stratum V of Mr. LYON's section*. From S. S. LYON, of Jeffersonville.

DALMANIA PLEIONE (n. s.).

PYGIDIUM convex : axis prominent. Lateral lobes flattened near the axis, and abruptly bent downwards at the sides. Axis marked by about nine or ten rings; the lateral lobes marked by five or six ribs, five of which on each side are prolonged into sharp rounded spines, and the caudal extremity produced in a short wide triangular process, which is not more than half the length of the lateral spines.

This species belongs to the group of which the *Dalmania* (*Cryphæus*) *boothii* may be regarded as the type : it has the pygidium more convex than that species, and the lateral spines are proportionally larger, more rounded and more widely spreading, while the caudal prolongation is a short deltoid process.

Geological formation and locality. In limestone of the age of the Upper Helderberg group, at the Falls of the Ohio.

DALMANIA ERINA (n. s.).

PYGIDIUM paraboloid : length and width, at the anterior side, about as three to four; axis very prominent, subangular, slightly compressed along the sides, marked by fourteen or fifteen rings. Lateral lobes nearly flat for more than half their width, bending abruptly downwards at the sides. Ribs twelve or thirteen, terminating abruptly in a spreading border which is scarcely marked by the furrows beyond the ribs : a faint impressed line along the centre of the ribs from the outer extremity to near the longitudinal furrow, where it bends gently downwards to the lower side. SURFACE finely granulose.

This species is readily distinguished from either of the preceding, by the prominent axis, wide and plain border, and surface without nodes or spines. The most characteristic specimen has a width, at the anterior margin of the pygidium, of one inch, and a length of three-fourths of an inch.

Geological formation and locality. In limestone of the Upper Helderberg group, at Williamsville, N.Y.

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* Transactions of the Academy of Sciences of St.Louis, Vol. i, p. 614.

DALMANIA BIFIDA (n. s.).

Pygidium small : width about once and a half the length, exclusive of the caudal extension. Axis moderately convex, marked by about nine or ten rings (perhaps, in well-preserved specimens, there may be one or two more). Lateral lobes marked by nine or ten ribs, which are grooved along the middle and terminate in a thickened border : on the posterior side the border is extended beyond the axis a distance equal to half the length of the latter, gradually narrowing, and the extremity distinctly bifid for half its length. Surface granulose.

Geological formation and locality. In the limestone of the Upper Helderberg group at Stafford. Collected by C. A. White.

DALMANIA BOOTHII.

Cryphæus boothii : Green, Silliman's Am. Journal of Science, Vol. 32, p. 344.
C. calliteles : Id. Ib. p. 346.
C. greeni : Conrad, Ann. Report Palæontology of New-York, 1839, p. 66.
Asaphus halli [?] : Id. Ib. p. 104.

The species originally described by Prof. Green are from strata of the age of the Hamilton group of New-York, and the common form in our rocks has usually been referred to the *C. calliteles.*

After examining at least one hundred specimens in various degrees of perfection, some of them nearly or quite entire, others which are the separated heads and pygidia, I am unable to point out any specific distinction among the specimens of that form in New-York to which Professor Green applied the name Cryphæus. The peculiar ornamentation, caused by the extension of the ribs of the pygidium beyond the border, presents some degree of variation, but is not accompanied by other characters which would induce me to distinguish these varieties as species. In several nearly entire specimens of small and medium size, I find all the characters described by Green as those of *C. boothii* and *C. calliteles.*

In the pygidia of larger specimens, the characters of *C. calliteles* are observed. In still other specimens, I observe important features, which, if the reference be correct, have been overlooked in the former descriptions. In the specimens before me, the entire length is less than twice the width; the head is very nearly semicircular, exclusive of the anterior border which is a little produced, and the posterior angles which are extended into wide flattened spines as far as the fifth rib of the thorax. The glabella is subovate, the longitudinal furrows being produced in nearly a straight diverging line from the base to the outer extension of the frontal lobe.

The frontal lobe of the glabella, in well-preserved specimens, is nearly twice as wide as long; the anterior furrow is very oblique, and sharply impressed; the median furrow is nearly rectangular, sharply impressed, and sometimes not reaching the longitudinal groove; the posterior groove is a little inclined backwards, and reaches the margin of the glabella; the occipital furrow is well defined at the sides and upon the cheeks, but less strongly in the centre. The occipital ring is strong and wide, prominent in the centre, and sometimes rising into a tubercle or short spine. Eyes prominent, rising much above the summit of the glabella, and, on that side, sloping abruptly to the dorsal furrow: five or six, and rarely seven lenses may be counted in the vertical line, and twenty-five rows; the anterior and posterior rows with two, three and four lenses. The lenses are prominent, and surrounded by a depressed circular line.

In the thorax, the axis is rounded, prominent, and a little narrower than the lateral lobes; the lateral lobes flat for half their width, and sloping abruptly to the margins. (This character, and the convexity and comparative width of axis, depend much on the degree of compression which the fossil has suffered.)

The pygidium is broad, semielliptical approaching to semicircular; the axis prominent and tapering to a rounded extremity, marked by nine or ten (sometimes eleven or twelve) rings; the lateral lobes marked by five ribs, which are separated by a deep groove, and the summit of each marked by a linear groove terminating at the border: the ribs are extended beyond in flattened foliate expansions, which are gently curved backwards. The centre or caudal prolongation is wider and shorter than the others.

Surface granulose or papillose; and, upon the fimbriate extremities, the papillæ are elongated.

In the larger specimens of pygidia, there are twelve or fourteen and even sixteen rings. The fimbria are produced in wide lanceolate extensions, and are strongly pustulose. When the crust is removed, there is a deep groove limiting the extension of the ribs of the pygidium, and the impressions of the fimbria are shown beyond this. A separated portion of the crust shows, that at the base of these fimbria, the border is abruptly thickened with an angular lower edge. The external surface presents some variations of character which have not been noticed, so far as I know. The occipital ring is often surmounted by a tubercle or spine, and the second ring of the axis of the pygidium in like manner: sometimes several rings of the pygidium are thus marked with more minute spines. Again we find the occiptal ring, all the annulations of the thorax, and many of those of the pygidium, marked by short spines.

I am not yet able to determine that the presence or absence of these spines is of specific importance. In the specimens heretofore described, the imperfection of the crust may have prevented the discovery of spines; and it is scarcely possible to constitute a new species upon this character, from strata whence three have already been described.

[September,

I am unable to find any characters in the Moravia specimens, to separate them from the others. I cannot therefore recognize the *Cryphæus greeni* as a distinct species. The CRYPHÆUS is common at York; and I am induced to believe that the specimens referred to *Asaphus halli* are this fossil with the fimbria removed, or the border separated. Extensive collections from York have not served to produce any other Trilobites than the DALMANIA (CRYPHÆUS) and PHACOPS.

Geological formation and locality. In the Hamilton group: at Hamilton; shores of Cayuga, Seneca and Canandaigua lakes; Geneseo, Moscow, York, Pavilion; and at Eighteen-mile creek on Lake Erie.

GENUS PHACOPS (EMMRICH).

PHACOPS BUFO (GREEN, sp.)

Calymene bufo: GREEN, Monograph, p. 41.

The geological position of this species is not stated by Dr. GREEN, but it is said to have been found in New-Jersey in a dark greyish limestone.

PHACOPS RANA (GREEN, sp.).

Calymene bufo, var. *rana*: GREEN, Monograph, p. 42.

Prof. GREEN has described (Monograph, p. 41) the *Calymene bufo*, the original of which is a specimen having "a length of four inches and a half," and "the breadth of the buckler nearly two inches."

I have never seen, in the rocks of New-York, an entire specimen of this genus having a length of more than two and a half inches. Some separated heads are an inch and an eighth long, and the length of the head in the common species is about one-third the entire length of the animal, which would give a length of less than three and a half inches for the largest specimen. The proportions of *C. bufo* do not agree with any specimens in the Upper Helderberg rocks or in the Hamilton group.

In an individual from the Hamilton group, of two and a quarter inches long, the width of buckler at base is one inch and a quarter; and in another of one inch and a half long, the width is about seven-eighths of an inch. The proportions given by GREEN would clearly indicate his *C. bufo* as a distinct species.

The *Calymene bufo*, var. *rana*, is cited by the same author as occurring at Seneca, Ontario county, N.Y.; which locality is in the shales of the Hamilton group. Specimens are common, and sometimes abundant in the shales of the Hamilton group; and a species, which I regard as identical with this, occurs in the upper limestone of the Upper Helderberg group.

PHACOPS RANA. Body elongate; length three times the width; sides nearly straight; head almost perfectly semicircular, except that the posterior angles project beyond the line. Glabella very gibbous, wider than long, with faint marks of the lateral lobes. At the basal angles of the glabella are rounded or ovoid tubercles, and, below the centre, a transverse elevation, with a few small papillæ like those of the surface : the occipital furrow is narrow, and the occipital ring wide and strong; cheeks spreading and rounded at their posterior extremities; the border is every where narrow and even. The eyes are of moderate size and neatly placed, rising nearly as high as the plane of the top of the glabella in well preserved specimens. In young specimens, there are five and rarely six lenses in the vertical rows; while in older specimens there are usually four lenses, the thickening of the palpebral lobe having obscured them. In a well-preserved specimen of medium size, the eyes (beginning on the anterior side) have one vertical row with four lenses, nine rows with five each, two rows with four each, two rows with three each, two rows with two each, and one lens in the posterior angle, giving altogether sixty-eight lenses in each eye.

The length of the thorax is equal to the width at the posterior end, which is about a seventh or eighth narrower than the anterior end. The axis is regularly rounded and moderately elevated; the lateral lobes flat for half their width, and somewhat abruptly bending at the sides. The pygidium is more than twice as wide as long; the axis marked by eight or nine, and rarely by ten rings. Seven or eight ribs may be counted in the lateral lobes of young specimens, the posterior ones becoming obsolete in older individuals.

This species occurs in large numbers, and specimens have been found from the size of half an inch to nearly three inches in length; and from measurements of separate l heads and bodies, we infer that individuals have been three inches and a half long. It agrees more nearly with the *Phacops fecundus* of BARRANDE, than with any other species known to me; and it would not be difficult to establish two or three varieties among our specimens.

Geological formation and locality. In the limestone of the Upper Helderberg group : in the Helderberg mountains, Schoharie, and throughout New-York; and in the Hamilton group everywhere, but more particularly in Central and Western New-York, as at Seneca and Cayuga lakes, Moscow. Geneseo, and other placea.

A specimen from Iowa, which I suppose to be from the same geological position, presents no important points of difference.

PHACOPS CRISTATA (n. s.).

ENTIRE BODY elongate; length a little more than twice the breadth. Head nearly semicircular; width a little more than twice the length. Thorax about one-seventh longer than wide. Pygidium semielliptical, about two-thirds as long as wide. Glabella prominent, ventricose, the longitudinal furrow separating the eye very narrow; neck small; occipital ring furnished with a small prominent spine. Eye prominent, narrow above, having six or seven lenses in the central vertical rows, and thirteen or fourteen rows from the anterior to the posterior side : the anterior angle has a single lens. Axis of the thorax prominent, angular, semielliptical, and marked by eight or more rounded rings, the summit of each ring having a short vertical spine. Lateral lobes flat for half their width and bent abruptly downwards, marked by six or seven ribs.

SURFACE granulose; the glabella papillose or tuberculous.

This species is readily distinguished by the crest of spines upon the back, and, in the separated heads, by the spine upon the occipital ring, which is very conspicuous even in the casts. The eyes are proportionally narrower and higher than in *P. bufo*, var. *rana;* the number of lenses in the vertical rows being more, while in the lateral direction there are fewer rows.

There is evidence of still another species in the same geological association, which may be indicated by the anterior extension of the frontal lobe of the glabella.

Geological formation and locality. In the Schoharie grit : Helderberg mountains and Schoharie.

The most satisfactory specimen for examination, which I have seen, is a mould in the gritstone which preserves the impressions of all the parts : this specimen is in the Cabinet of the Albany Institute. Besides well-marked fragments of the head, I have an entire specimen from which the crust is removed, received many years since as coming from the Schoharie grit, and the condition of the specimen corroborates that opinion ; but, unfortunately, the distinguishing specific features are mainly obliterated.

PHACOPS BOMBIFRONS (n. s.).

In the limestone of the Helderberg mountains, there is a PHACOPS which cannot be identified with any of the varieties of *P. bufo*, or *P. bufo*, var. *rana*. The specimens which I have seen are separated heads, with a very prominent glabella, a neck wider than in the *P. cristata*, a narrow furrow between the eye and the glabella ; the eye elevated and narrower than in *P. rana*, with the palpebral lobe more prominent. The limitation of the

lens-area in the cast is elliptical; and there are about five lenses in the central vertical lines, and laterally about twelve or thirteen rows, with a single lens in the posterior angle.

The glabella is strongly tuberculated; the cheek-border in the lower side strongly denticulated, as many as seven denticulations between the antero-lateral extension of the glabella and the posterior angle of the border; the posterior angle rounded, with a short spine or node-like process about half-way between the eye and the posterior margin.

Geological formation and locality. In the limestone of the Upper Helderberg group: Helderberg mountains, Albany county, N.Y.

PHACOPS CACAPONA (n. s.).

In some collections obtained many years since from a friend in George-town, D.C., are two specimens of PHACOPS, labelled "from the mouth of Capon river, near its junction with the Potomac." These specimens are clearly distinct from any species in New-York: they are partial casts, but preserve some of the surface-characters. The glabella is short and wide, and three tubercles are preserved in the occipital furrow. The eyes are much elevated: there are seven lenses in many of the vertical rows, and nineteen rows may be counted laterally, the one in the posterior angle having two lenses. The body is broad, the width in a coiled specimen being equal to the length: the axis is comparatively broad and rounded, nearly as wide as the lateral lobe. The caudal shield is undeterminable. The surface of the glabella is marked by rounded tubercles, which are distributed with some degree of regularity.

The proportions of the body are distinguishing features; but the form of the eye, the number and arrangement of the lenses are more distinctive, when compared with either of the other species. The specimens are converted into a reddish grey siliceous material.

This species may perhaps be identical with that sent by Prof. DUCATEL to Prof. BRONGNIART, and indicated by him as *Calymene macrophthalma;* but the specimen figured on Plate i, fig. 4, of the "Crustacés fossiles," is certainly not identical with this one.

The large specimen (a cast in plaster sent by Dr. HOSACK), indicated by M. BRONGNIART as coming from the United States, is the original of Prof. GREEN'S *Calymene anchiops*, a DALMANIA as already indicated in this paper.

When compared with the cast of *P. bufo* of GREEN, the greater proportional breadth becomes a distinguishing feature, and the glabella is much less produced anteriorly. The form and proportions of the eye in the cast do not furnish any means of comparison.

Geological formation and locality. The locality named "Mouth of the Capon river near the Potomac," indicates a geological horizon of the Upper Helderberg or Hamilton group.

GENUS PROETUS (Steininger).

The Genus Proetus acquires its greatest development, in this country, in the Upper Helderberg and Hamilton groups. Regarding these as the equivalents of the Devonian in Europe, this result is not in accordance with that obtained by M. Barrande, who shows by far the greatest development of species of this genus in Upper Silurian strata, and a great diminution of species in the Devonian rocks.

In the United States, as far as I know, species of this genus are rare in the strata below the Schoharie grit. The species before me at this time, with a single exception, have ten articulations in the thorax. Although several species have granulose or papillose surfaces, I have not discovered spines or lateral appendages upon any of them. Of the species described, seven are entire specimens; the others consist of heads or of pygidia, and of the the thorax and pygidium.

PROETUS CONRADI (n. s.).

Body oval; length less than twice the width. Head nearly semicircular: the border is wide, a little convex, gently sloping towards the margin, and prolonged behind as far as the middle of the thorax. The furrow in the crust is a simple rectangular depression of the surface, but, in the cast, becomes an abrupt groove, with the inner side straight and the outer side strongly curving. Glabella convex, somewhat ovoid, narrower in front, a little longer than wide: lateral furrows obscure, the posterior one curving from nearly opposite the centre of the eye backwards to near the base. The facial suture bends a little outward from the eye, and curves inwards towards the margin. The eye is large and well developed, and somewhat elongate.

Thorax consisting of ten segments; the axis prominent and semicircular, the annulations direct; the lateral lobes flat or slightly convex for a third of their width; the ribs marked by a sharply defined furrow; the anterior limit narrower and very angular on the anterior margin, filling a slight depression in the posterior margin of the posterior limb: extremities obtuse.

Pygidium semicircular; the axis very prominent, and forming about one-third the width at the anterior margin and three-fourths the entire length; marked by ten or eleven rings, the two anterior ones being direct, and those of the middle portion bent backwards and a little flattened on the summit: the lateral lobes marked by four or five ribs, which are distinctly grooved in the middle

and terminate in a scarcely marked furrow, beyond which is a thickened border.

Surface very minutely pustulose.

This species is distinguished by its wide semicircular head, very narrow groove, and wide border. The ribs in the lateral lobes of the pygidium are faintly developed, and sometimes obscure. The minute pustulose markings, when viewed under a lens, have their longest diameter transverse to the axis.

Geological formation and locality. In the Schoharie grit at Schoharie, and in the Helderberg mountains.

PROETUS ANGUSTIFRONS (n. s.).

The specimens of this species consist of a part of the head and the pygidium, which, from being associated in the same beds, and from similarity of surface-markings, I infer may belong to the same species. The glabella is moderately prominent, ovoid, the length and greatest width at base as six to five, and gradually narrowing from the base to the anterior end: the anterior furrow is narrow and not deep, with a wide flat border beyond. The occipital furrow is narrow, and the occipital ring wide and flat upon the top, and abruptly narrowed at each side, with low defined nodes. The pygidium is semicircular, very convex; the axis prominent, broadly rounded, terminating abruptly behind, marked by ten rings; the lateral lobes marked by six or seven ribs, which are longitudinally grooved: border wide, strongly striate on the lower side, and thick. Surface granulose.

This species differs from the preceding in the narrower and proportionally more elongate glabella; the border is more flat, and the furrow more gently depressed; the pygidium is stronger and more convex, and the posterior extremity of the axis more elevated.

Geological formation and locality. In the Schoharie grit: Schoharie.

PROETUS HESIONE (n. s.).

A single specimen of the pygidium, associated with the preceding species in the same rock, presents characters so unlike either of the others, that it must be at once recognized as distinct.

Pygidium semielliptical, wider than long, length and breadth about as six to eight: axis prominent, a little compressed at the sides above the furrow, gradually tapering, marked by about thirteen or fourteen rings; those above and below being nearly direct, while those in the middle, rising vertically from the base, are bent backwards above the middle of the sides of the axis, and

make a slight retral curve on the summit. The lateral lobes are marked by nine ribs, which are deeply grooved along the middle, and more sharply marked in the cast. The ribs terminate on the border in a distinct groove, the outer side of which is nearly flat; thence bending abruptly downwards, and a little spreading at the margin, making the border gently concave.

Surface unequally pustulose; the pustules on the ribs of the pygidium arranged in rows on each side of the groove, and distinctly marked in the cast.

This species will be readily distinguished from the preceding by its form and the distinctness of the ribs in the lateral lobes, and more distinct groove along the centre, as well as stronger pustules.

Geological formation and locality. In the Schoharie grit at Schoharie.

PROETUS CLARUS (n. s.).

Body very convex, elliptical; width two-thirds as great as length. Head very convex, nearly semicircular; length a little greater than half the width; the anterior and sides limited by a border of moderate width with a narrow furrow, beyond which it is almost flat for more than half the width, then slopes suddenly to the margin. In the cast the furrow becomes wider, and is limited by a narrow rounded ridge, beyond which the surface is concave to the outer margin. The border is prolonged posteriorly into spine-like processes, extending to about the fourth articulation. Glabella very prominent, round-ovoid; length equal to the width at base, gently narrowing and rounded in front : the occipital furrow narrow, with a strong occipital ring. Eyes prominent, two-thirds as high as long.

In the thorax, the axis is prominent, semicircular in profile, the annulations direct : the lateral lobes are nearly flat for one-third their width, and then bend at an obtuse angle along the line of the geniculation of the ribs. Ribs sharply grooved a little anterior to the middle : the salient anterior portion of the rib rests against the posterior margin of the next anterior rib, which is distinctly bent backwards at this point.

The pygidium is semicircular; the axis very prominent, with nine or ten rings : the lateral lobes are a little flattened near the axis, and slope abruptly to the margin. Five or six ribs may be counted, which are marked by a shallow longitudinal groove, but are simple

in the cast : furrow of the limb very shallow, but much more distinct in the cast; the lower side of the border marked by distinct concentric striæ.

Surface granulose; the rings of the axis minutely pustulose.

The larger specimens of this species measure about one inch in length. It is distinguished from the *P. angustifrons* of the Schoharie grit by the more abruptly prominent axis, the angular lateral lobes, and more prominent ribs of the pygidium, as well as coarser surface-markings.

Geological formation and locality. In the upper limestone of the Upper Helderberg group : at Stafford, Batavia, and elsewhere in Genesee co. N.Y.

PROETUS CRASSIMARGINATUS

Calymene crassimarginata : HALL, Geol. Rep. Fourth District N.York, p. 172, f. 5.

Proetus crassimarginatus : HALL, Corrected List of Fossils, Twelfth Annual Report of Regents on the State Cabinet, p. 88.

Phillipsia crassimarginata : Cited by BILLINGS in the July number of the Canadian Journal, 1861, p. 362.

This species is chiefly known by the numerous pygidia which occur in many localities in New-York and elsewhere. The pygidium is remarkably convex or *bombé* : it has a length and breadth sometimes nearly equal ; but, when not distorted, it is wider than long. The axis is very prominent and rounded ; and in good specimens, sixteen or seventeen rings may be counted, and usually thirteen or fourteen. The annulations are not direct, but are inclined a little forward at their origin, and, at a point about halfway up the side, they bend a little backward so as to be vertical ; and again on each side of the summit there is an abrupt sinuosity, and a narrowing of the ring which, at the summit, is wider and direct. The sides of the axis present a very peculiar appearance, as if the lateral lobes were continued into the axis with the same advancing direction, and they terminate in acute points at a little more than one-third the height of the axis ; and into the interstices between these points the rings of the axis are inserted, making a little advancing curve, and a more abrupt retral curve before reaching the summit. The dorsal furrow is well defined, and the lateral lobes very convex. The ribs are twelve or thirteen in number, simple, terminating in a well-marked furrow ; beyond which there is a strong thickened border, which is concentrically striated on its outer margin and on the lower side.

In the cast, the dorsal and marginal furrows are more strongly defined, and the thickened border is more prominent than when the crust is preserved. Surface finely granulose.

Two fragments of the head have been observed in the same association with these pygidia. One of these (from Williamsville, the most prolific locality of the species) has a very convex glabella one inch in length and seven-eighths of an inch in width at the base, narrowing but little towards

the front, which is obtusely rounded : the border in front of the glabella is deeply concave, and rises to the margin, which is thickened and striated.

Geological formation and locality. In the upper limestone of the Upper Helderberg group : at Williamsville and other places in Western New-York , in Canada West ; in Ohio, and at the Falls of the Ohio.

PROETUS CANALICULATUS (n. s.).

A fragment of this species, preserving the glabella, presents characters distinguishing it from any other in these rocks. The glabella is convex, ovoid, width and length about as five to six ; somewhat abruptly contracted opposite the anterior angles of the eye, and again a little spreading before curving to the anterior margin. The anterior glabella-furrow is short, and curves gently backwards : the second furrow begins at the anterior angle of the eye, is longer, and curves backwards ; while the third furrow originates opposite the centre of the eye, is nearly rectangular to the axis for a short distance, and then bends abruptly backwards, reaching nearly to the base of the glabella : at the centre of the base of the glabella there is a little prominence, and a slight depression on each side, while the posterior angles are subtruncate. Occipital furrow narrow, with an occipital ring of moderate strength. At the anterior margin of the glabella, the limb is marked by a sharp furrow, which is margined by a slight elevation ; beyond which it is regularly concave to a narrow ridge, and between this and the outer margin is a narrow even groove. Surface finely granulose.

The last-mentioned groove, the form of the glabella, and the peculiarity of the posterior glabellar furrow, are distinguishing features.

Geological formation and locality. In limestone of the age of the Upper Helderberg group : at the Falls of the Ohio.

PROETUS VERNEUILI (n. s.).

An entire specimen, which has the anterior part of the thorax and head crushed and distorted, presents peculiar and distinguishing characters in the pygidium. The glabella is small and very prominent ; the border is a little concave, and much extended in front. The thorax is comparatively small ; the axis very prominent, a little compressed on the sides : lateral lobes somewhat flattened near the axis, and curving abruptly downwards. Pygidium proportionally large, width nearly once and a half the length : axis prominent, a little compressed on the sides, marked by eleven rings, which are direct from the base, but bent backwards, and are a little thickened in the middle ; the second from the anterior margin, shows the base of a small spine : lateral lobes a little depressed at the dorsal furrow, and regularly convex beyond, marked by eight rounded ribs which are deeply sulcate be-

tween. The ribs terminate in a shallow groove; beyond which, and nearly in continuation, but bending a little backwards, elongate pustule-like nodes correspond in number to the ribs, with two more on each side posterior to the point where ribs can be counted, and a central one in a line with the pygidium, making ten on each side the central one: the anterior ones are longer and larger, and the posterior ones less conspicuous. Near the anterior margin, the border beyond these pustules is a narrow rim which increases in width anteriorly. Entire surface granulose or minutely papillose.

The pygidium is readily recognized by the ornamented border.

Geological formation and locality. In limestone of the age of the Upper Helderberg group: Williamsville, N.Y.

PROETUS HALDEMANI (n. s.).

Entire body narrow, subelliptical, posterior end narrower; length $\frac{75}{100}$, and width at base of head $\frac{45}{100}$ of an inch. Head semicircular, with the posterior angles of the border produced: the groove in front is shallow and not strongly defined, the border beyond thicker and rounded; the facial suture, in its anterior extension, bends outwards to a line beyond the longitudinal centre of the eye, and, from this point in the furrow, bends forward to the margin of the limb. Glabella ovate, distinctly contracted opposite the anterior angles of the eyes; length a little greater than the greatest width: lateral lobes marked by furrows all directed obliquely backwards; the third one cutting off the posterior angle, and scarcely reaching the base. The occipital furrow is narrow, and the occipital ring a little stronger than the rings of the thorax.

Thorax neatly defined; axis prominent, the annulations of the lower half directed a little forwards in the middle: lateral lobes flat as far as the geniculation of the ribs, and then bent abruptly downwards in a nearly straight line, the extremities of the articulations curving a little forward.

Pygidium neatly symmetrical, semioval, the length and width as five to seven; axis moderately elevated, gradually tapering, marked by twelve or more articulations, the middle ones of which are slightly undulated: lateral lobes gently convex for half their width and sloping a little abruptly at the sides, with about twelve ribs on each side, terminating in a shallow furrow and surrounded by a plain thickened border. Two or three of the anterior ribs of the pygidium extend across the furrow, and are perceptible in the

thickened border. About half the ribs are distinctly divided towards their extremities, and a faint groove is perceptible along the whole length of several of the anterior ones. The crust is all preserved except on the greater part of the glabella, and though somewhat worn (from much handling), appears to have been finely granulose or papillose, the worn surfaces a little punctate. The edges of the border, both of head and pygidium, are striate.

This neat and beautiful species was presented to me many years since by Professor S. S. HALDEMAN, of Columbus, Pa. The specimen is from Pennsylvania, probably from rocks of the age of the Hamilton group. At this time I have before me the pygidia of several specimens from the Goniatite limestone, near the base of the Hamilton group, which are specifically undistinguishable from this one; having the same number of ribs and proportions essentially the same, not differing more from the typical form than may result from pressure and other causes. The surface of one specimen is somewhat rougher; and in one, the groove of the ribs is more strongly marked.

In the body and head, this species is readily distinguished from the others here described: in the separated pygidia, the axis is less prominent and more pointed below.

Geological formation and locality. In limestone of the age of the Hamilton group? Pennsylvania; and in the Goniatite limestone, Manlius and Cherry-valley, N.Y

PROETUS ROWI.

alymene rowi: GREEN, Amer. Journal of Science and Arts, Vol, xxxiii, p. 406.

This Trilobite was first noticed by Mr. LE ROW, in the Poughkeepsie Telegraph, Nov. 22, 1837; and described by Prof. GREEN in the following year, as cited. Several years since, I obtained the loan of the original specimen from Mr. LE ROW, and had a cast taken in plaster, and a drawing made: the plaster cast measures a little more than one inch and a half. I have a mould in stone of a specimen from Otsego county, which measures nearly the same as the former.

The entire head is ovate; the breadth at base of buckler is one inch, and, at the anterior margin of the pygidium, three-fourths of an inch. The head and body are remarkably convex; the glabella-extremity prominent, ovate; the length half an inch, and the greatest width between the eyes a little more than four-fifths of an inch, somewhat contracted just opposite the anterior angles of the eyes. The glabella-furrows are indistinctly shown in the mould in stone, and in another imperfect specimen; and the posterior one has apparently produced a slight indentation at the base. The eyes are very prominent, and much below the plane of the summit of the glabella. 1861.]

The border is wide, but the details cannot be made out. The posterior angles are produced in spines, which reach as far as the fourth (and perhaps the fifth) articulation of the thorax.

The thorax has the middle lobe very large and extremely convex, its width in the middle being greater than the width of the lateral lobe; gradually tapering from the anterior, and almost pointed at the posterior extremity in the pygidium : dorsal furrow strongly marked, with a slight depression of the lateral lobes towards the furrow, thence a little flattened and regularly curving downwards to the margin.

The pygidium is very convex, twice as wide as long and nearly semicircular, being a little narrowed below the middle; the axis prominent, conical, marked by ten or twelve* rings, which are vertical or ascending near the base, and a little bent backwards near the top and sides : lateral lobes marked by seven or eight ribs, some of which are marked by a longitudinal groove a little above the centre. Surface granulose.

This species is readily distinguished by the ovate form, great convexity, prominent glabella and robust axis, which, from being wider than the lateral lobes at its anterior extremity, tapers nearly to a point in the pygidium.

Geological formation and locality. In the coarse sandy shales of the Hamilton group : at Fly creek and other places in Otsego county; and in the coarser shales and conglomerate beds of the same group in Schoharie county, N.Y.

PROETUS MARGINALIS.

Calymene marginalis [?] : CONRAD, Ann. Rep. Palæontology N.York, 1839, p. 66.

"C. MARGINALIS. Buckler with a broad margin : eyes large, semi-
"oval; middle lobe entire, convex, smooth; abdomen ...."

"*Locality*, near Ithaca, in a boulder. This has a much less prominent "front than the [*C.*] *rowi*, a deeper groove between the eye and middle "lobe; and the tubercle, which nearly joins the lower angle of the eye, is "much smaller."

The boulder alluded to is a large mass of the Tully limestone many miles south of the outcrop of that rock; and from this circumstance, I am induced to regard the PROETUS of this rock as the fossil described by Mr. CONRAD.

The entire form of the body is oval-ovate; the length about once and a half as great as the width. The head is margined by a wide border, which is produced into short posterior spines. The groove in front of the eye is narrow and well defined, becoming broader on the cheeks. Beyond the groove the border is at first convex, thence sloping abruptly and spreading in a

* Ten can be counted, and there is space for two more; but I have no specimen which clearly shows the full number

wide gently concave surface. The glabella is ovoid, very convex; the length a little greater than the width at base. The anterior and middle glabellar furrows are not conspicuous, but appear as gently curving lines, and originating near the anterior angle of the eye. The posterior furrow causes a slight indentation, and, curving backwards, reaches nearly to the posterior margin (all the furrows being visible in the cast). The occipital furrow is narrow; the occipital ring of medium width, and narrowing so as to become obsolete near the dorsal furrow; the nodes of moderate size and prominence.

In well-preserved specimens the thorax is about once and a half as wide as long, the axis and lateral lobes being nearly equal in width; while in flattened specimens, the axis is wider than the lateral lobe. Axis rounded and prominent; the lateral lobes flat for nearly half their width, and not depressed at the dorsal furrow. (Other specimens, from compression, have an apparently wider axis and a depression along the dorsal furrow.) The pygidium is semioval, two-thirds as long as wide: axis prominent, and marked by nine or ten rings; the lateral lobes with seven ribs, which are grooved along the centre, and terminate in a narrow convex border. Surface granulose.

This species, when compared with the *P. rowi*, shows the distinctions pointed out by Mr. CONRAD of the less prominent glabella and smaller occipital nodes. Compared with the *P. clarus* of the Corniferous limestone, there are few conspicuous differences; the most important, as far as observed, being in the form and extension of the border of the head. This species, however, is separated by one thousand feet of deposits, in which no similar form of PROETUS is known to occur.

Geological formation and locality. In the Tully limestone, near Ovid in Seneca county, N.Y. Collected by JOHN CHAMBERS.

PROETUS MACROCEPHALUS (n. s.).

ENTIRE BODY elongate oval-ovate; the head, thorax and pygidium nearly equal to each other in length. Head large, somewhat semicircular, with the border produced behind in short sharp spines; the anterior portion of the border marked by a semicircular groove in advance of the glabella; the margin thickened and recurved, marked on its upper, lower and lateral faces by sharp parallel elevated striæ or ridges which are separated by regular rounded grooves. Glabella prominent, ovate; width and length about as five to six: anterior and middle furrows distinct; and the posterior one, extending almost directly inwards from a point a little posterior to the middle of the eye, turns abruptly and extends to the posterior margin, leaving a large ovate distinctly

separated posterior lobe. The eyes are very prominent (when well preserved): the facial suture, as far as can be ascertained, extends in an almost straight line from the eye to the frontal margin.

The hypostoma is ovate and very convex. The thorax forms a parallelogram, the width being nearly twice the length, and but slightly diminishing posteriorly: the axis strong, elevated, nearly semicylindrical; the dorsal furrow strongly marked, and the lateral lobes flattened or a little concave on their inner side, and bending abruptly towards the margins. The furrow in the ribs is almost linear, and the anterior limb is scarcely curved on its margin.

The pygidium is about equal in length to the head, semielliptical; the axis prominent, elongate-conical, marked by thirteen or fourteen rings, which are thickened at the base and rise vertically, bending a little backwards on the upper part of the sides, making a curve which extends over the summit: the rings are somewhat thickened at the summit, and may have been nodose or spinose. Lateral lobes depressed towards the dorsal suture, flattened or moderately convex in the middle and sinking abruptly at the sides, marked by about eleven ribs which are scarcely (or not at all) grooved. The border is broadly concave, the outer edge a little recurved.

Surface of the head marked by small pustule-like papillæ, which are inclined backwards; the thorax and pygidium marked by sharp pustulose points, which are sometimes arranged in rows upon the articulations. The crest of the axis appears to have been nodulose or spinose; but of numerous specimens examined, none are quite perfect in these parts.

A separated cheek shows the eye to have been extremely elevated.

This species has a well-marked expression, differing from all the others described. The large glabella and distinct separation of the elongate posterior lobe are very characteristic. The specimens examined consist of three nearly entire individuals, and about eleven of the pygidia.

Geological formation and locality. In the shales of the Hamilton group: Geneseo, Moscow, Pavilion, and Canandaigua and Skeneateles lakes, N.Y.

PROETUS MACROCEPHALUS, *var. a.*

A specimen nearly entire, and several pygidia, present some variation from the strict characters given of the preceding. The pygidia are semicircular, twice as wide as long; the rings of the axis distinctly nodose on the summit, and the little pustulose maikings of the ribs on the lateral lobes are arranged in two rows.

There are four specimens exhibiting the form of pygidium and character of surface indicated; and another, with a semicircular pygidium, has the ribs angular.

Geological formation and locality. In the shales of the Hamilton group: at Moscow and Bloomfield; and in a stratum of limestone in the Hamilton group, at Eighteen-mile creek on Lake Erie.

PROETUS AURICULATUS (n. s.).

GLABELLA round-ovate, the length equal to the greatest breadth across the posterior lobes: anterior to the furrows, the breadth is one-fifth less; the measurements being five-eighths, and half an inch. The anterior and middle furrows are gently curved; the posterior one more oblique, and deeply separating the short ovoid posterior lobe from the body of the glabella. The occipital furrow is strongly defined: the border is deeply depressed immediately in front of the glabella, rising abruptly beyond, and again depressed in a narrow groove, with the margin recurved.

In the same association there has been found a pygidium with a very prominent rounded axis, terminating abruptly behind, and marked by nine or ten direct rings; and the lateral lobes by seven or eight ribs (the posterior ones being obscure, as are the rings of the axis), terminating in a wide spreading border. The glabella is distinguished by its very convex form, the equal length and breadth, and the distinct separation of the posterior lobes. The axis of the pygidium is proportionally broader and stronger than in any other species described in this paper.

This species very nearly resembles the *Proetus missouriensis* of SHUMARD (Geological Report of Missouri, pa. 196, pl. B, f. 13 *a*, *b*); but the glabella is proportionally longer. There is a less degree of similarity in the pygidim of that species, and the one found associated with the glabella of this species.

Geological formation and locality. In shaly sandstones of the age of the Chemung group: in Licking county, Ohio.

PROETUS OCCIDENS (n. s.).

The pygidium is semielliptical, having a length of three-fourths of an inch by a width of nearly one inch; the axis of moderate elevation, rounded and tapering to a narrow extremity, marked by ten or more rings: dorsal furrow not strongly defined; the lateral lobes sloping gently from the furrow for two-thirds their width, and beyond this more abruptly; marked by nine or ten flattened ribs, beyond which the markings are obscure.

Surface finely granulose.

This species, in proportions of the pygidium, resembles some of the flattened specimens of *P. macrocephalus;* but the rings of the axis and ribs of the lateral lobes are fewer, and are not pustulose. It is very distinct from any species described in this paper.

Geological formation and locality. In the shaly limestone of the age of the Hamilton group: at New-Buffalo, Iowa.

PROETUS LONGICAUDUS (n. s.).

Entire body elongate-ovate, gradually tapering in a curved line to the posterior extremity. Head broadly semielliptical, very convex in the transverse direction; the limb wide and thick, gently depressed in front of the glabella, and sloping to the margin; posteriorly the border has been produced into angular or spiniform extensions. The glabella is ovate, slightly contracted and nearly straight for a little distance in advance of the eyes, and then abruptly rounded in front; extremely convex between the eyes, and somewhat abruptly sloping towards the front. The anterior furrow curves gently from the anterior angle of the palpebral lobe, and reaches halfway to the centre of the glabella: the middle furrow rises from nearly opposite the anterior fourth of the eye, and is a little longer than the anterior furrow; the posterior furrow rises from opposite the middle of the eye, and curves gently backwards, coming out on the base of the glabella so that the two divide its width into three nearly equal parts. The occipital furrow is narrow and sharply defined; the occipital ring a little stronger than the body rings, and flattened at the dorsal furrow, but without nodes. Eyes neatly defined, prominent and semioval.

The thorax is short, with parallel sides and a prominent semi-

cylindric axis marked by nine annulations : lateral lobes nearly flat for half their width; the ribs sharply grooved; the anterior limb angular on the margin.

THE PYGIDIUM is remarkably elongate, having a length and width almost precisely equal : the axis prominent; section semielliptical, the height being more than half the width, and very gradually tapering to an obtuse point; marked by twenty-two annulations which are vertical on the sides, but a little bent forwards on the summit of the axis. Lateral lobes flat near the axis, thence curving gently to near the middle of the width, and bending more abruptly downwards; marked by twelve ribs, and terminating in a broad sloping border which is abruptly turned upwards at the margin. SURFACE finely granulose.

This species is remarkable in having but nine articulations of the thorax, in the extreme elongation of the pygidium, and the number of rings in the axis. The glabella is more prominent between the eyes, than in any species which I have seen. In all these respects, and in the absence of nodes at the base of the occipital ring, it differs so greatly as to afford few points of similarity with any of the species described in this paper.

Geological formation and locality. This species, together with a PHACOPS undistinguishable from *P. bufo*, var. *rana*, were given to me by Rev. Mr. NASH of Desmoines, Iowa; who informed me that they were from some point far to the northeast of that place, the particular locality having been lost or forgotten. The region indicated is occupied by a broad belt of the Hamilton group, and I presume this speeies to be from rocks of that age.

GENUS LICHAS (DALMAN).

LICHAS ARMATUS (n. s.).

In the collections from Western New-York, there are several fragments of a species of LICHAS, in many respects similar to *L. pustulosus*, and also to *L. bigsbyi*. The pygidium is rounded to the limits of the border on the lower side, making very nearly a semicircle, the centre being at the anterior margin of the axis. The axis is marked by three indistinct rings on the upper half; and in the middle it becomes very gibbous and surmounted by a strong spine, the other portions of the surface nodose. The lateral lobes are deeply grooved; the anterior limb marked by small nodes, and the posterior limb by a row of strong elevated nodes with intermediate smaller ones.

A portion of a head, obtained from limestone of the same age in another locality, resembles the head of *L. bigsbyi.* The median lobe is very gibbous, rising almost vertically in front, somewhat abruptly narrowed and depressed behind, separated by a distinct furrow from the anterior and middle lobes : anterior lobe gibbous, oblong, wider behind than before, without distinct limitation between it and the middle lobes. Occipital furrow strongly marked, with a wider occipital ring : palpebral lobe small. Eye almost semicylindrical. Entire surface pustulose : pustules of unequal size.

The anterior lobe of the glabella is less abruptly gibbous in front, and more gradually tapering behind, than in the other species : the form of the lateral lobes is also distinctive, and the pustules on the surface more elevated and unequal.

Geological formation and locality. The pygidia are from the upper member of the Upper Helderberg group at Williamsville, and the head from the same position in Schoharie county, N.Y.

LICHAS GRANDIS (n. s.).

A remarkable fragment, which appears to be the posterior part of the head of a Lichas, preserves the base of the anterior lobe of the glabella, which is narrowed and depressed between the lateral lobes, and spreads a little towards the occipital furrow. The lateral lobes are large, broad and strongly elevated, the summits surmounted by elongate nodes, with smaller nodes or tubercles upon other parts of the surface. The occipital furrow is of moderate width and depth; the occipital ring wide and strong, the anterior portion with numerous small tubercles, and the posterior portion ornamented by four strong elevated clavate nodes.

This fragment agrees perfectly with Lichas in the disposition of the parts of the head preserved, viz. the remains of an anterior lobe and two lateral lobes, with a strong occipital ring. The specimen is more than three inches in diameter; and from the occipital ring to the broken anterior margin, it is two and a half inches.

Geological formation and locality. In the Schoharie grit : Schoharie.

GENUS ACIDASPIS (Murchison).

Some fragments of trilobites have been found in the Schoharie grit, which may belong to this genus. Up to this time, however, the specimens obtained are too imperfect and unsatisfactory for description.

GENUS BEYRICHIA (M'Coy).

BEYRICHIA PUNCTULIFERA (n. s.).

Carapace valves minute, semioval, almost equilateral, the anterior end very slightly narrower, convex and abruptly bending downwards to the dorsal margin; marginal rim well developed, and sharply elevated on the ventral and lateral margins. The surface, at the more prominent part above the centre, and just at the bending towards the dorsal margin, is marked by two very prominent nodes, which are nearly equidistant from the margins and from each other. The entire surface is punctate with minute rounded pits.

This species is scarcely more than the twentieth of an inch in height; but it is distinguished by the minutely punctured surface and very prominent dorsal nodes.

Geological formation and locality. In the shales of the Hamilton group: in Ontario county, N.Y.

GENUS LEPERDITIA (Rouoult).

LEPERDITIA CAYUGA (n. s.).

Valves strongly convex, subovate, length about once and a half the width, subtruncate at the anterior end; ventral margin somewhat abruptly curved, the greatest width a little posterior to the middle. The left valve is apparently thickened towards the ventral margin; but the specimens are in such a condition as to afford no satisfactory evidence of the surface-markings.

Geological formation and locality. In the Corniferous limestone: at Blanding's quarry, Springport, near Cayuga lake, N.Y.

LEPERDITIA SPINULIFERA (n. s.).

Minute, ovoid, length less than one-sixteenth of an inch. Valves most convex and a little gibbous towards the posterior end. Anterior tubercle strongly developed, and close to the dorso-lateral angle; the antero-central portion a little depressed, with a very minute and scarcely defined tubercle: the posterior end is obliquely subtruncate and very obtuse; the posterior dorso-lateral angle marked by a distinct node, and the posterior ventro-lateral

angle has a distinct spine projecting obliquely beyond the margin. The hinge-line is canaliculate on the back, and the margins of the valves project in a thin sharp line along their junction at the ends, and less conspicuously on the ventral side.

SURFACE marked by distinct undulating striæ.

This species has all the external marks of LEPERDITIA; and the striæ, or impressions of the vessels radiating from the central tubercle, are very distinct under a lens.

This shell is slightly smaller than *L. punctulifera* of the same rocks.

LEPERDITIA SENECA (n. s.).

In the same shale with *L. spinulifera* are several specimens of a short ovoid form of LEPERDITIA, which is essentially smooth, and for the most part the individuals are smaller. A larger specimen of apparently this species, where the crust is removed, shows an indentation on the centre of the valve. An impression of another individual has the appearance of having been made by a granulose surface.

Of the three species known in the Hamilton group, the *L. punctulifera* is far the most abundant.

Geological formation and locality. In the shales of the Hamilton group: Ontario county, N.Y.

ANNELIDA.

GENUS SPIRORBIS (LAMARCK).

SPIRORBIS ANGULATUS (n. s.)

DISCOID or very slightly ascending, making two or more volutions: outer volution robust; the transverse diameter greater than the dorso-ventral, and the sides sometimes subangular. Surface lamellose striate, the lamellæ undulating and sometimes crowded into ridges, and the upper angular side sometimes nodose. The aperture is rounded or oval, and usually nearly rectangular to the plane of volution, but sometimes turned upwards.

This species is usually attached to shells, and particularly to TROPIDOLEPTUS. It is a mose robust species than the *S. laxus*, and less distinctly annulated.

Geological formation and locality. In the shales of the Hamilton group: at Darien in Erie county, and in Ontario county, N.Y.

[September 1861.

NOTE.

THE TRILOBITES enumerated and described in the preceding pages include all those satisfactorily known to me at this date, from the Upper Helderberg, Hamilton and Chemung groups, with the exception of the following species which was omitted in the proper place.

HOMALONOTUS DEKAYI (GREEN, sp.).

Dipleura dekayi : GREEN, Monograph, p. 79.
Nuttainia sparsa : EATON, Geological Textbook.
Homalonotus dekayi : VANUXEM, Report of the Third Geological District, p. 150.
— — : HALL, Report of the Fourth Geological District, p. 205.

This species is known in the Hamilton group from near the Hudson river to Lake Erie; but is comparatively rare on the west of Cayuga lake, and extremely rare to the west of the Genesee valley.

The *Phacops nupera* (*Calymene nupera*, Report 4th Geol. District of New-York), from the Chemung group, may probably be only a variety of *Phacops rana*, though its condition is such as not to admit of critical comparisons.

I have had no opportunity for investigating the following species, described by Mr. CONRAD in the Annual Report on the Palæontology of New-York for 1841, p. 48, from the Schoharie grit and Onondaga limestone.

" ASAPHUS? ACANTHOLEURUS. Pygidium very wide at base; margin " lunate, but projecting in the middle. A broad space between the ends " of the ribs and the margin, on which are nine thick erect spines, the " central one largest. Surface of the lobes with coarse tubercles. *Loca-* " *lity :* Near Schoharie, in limestone with ODONTOCEPHALUS (Onondaga " limestone), found by Mr. GERHARD jr."

" A.? DENTICULATUS. Pygidium with a lunate margin, denticulate at the " termination of the ribs : ribs simple, with two rows of minute tu- " bercles on each. *Locality :* Schoharie, in Grit N° 18. Found by Mr. " GEBHARD."

A wax cast, from an impression of the first of these species, shows a character of pygidium not unlike that of *Dalmania myrmecophorus*. Both species doubtless belong to the Genus DALMANIA.

SUPPLEMENTARY NOTE TO THE THIRTEENTH REPORT OF THE REGENTS ON THE STATE CABINET.

In the Thirteenth Annual Report of the Regents upon the State Cabinet, I published a notice of the Trilobites of the Quebec group, occurring at Georgia (Vermont), proposing the generic names Bathynotus and Barrandia for the two generic forms. At the moment of sending the manuscript to press, I had changed the generic name Olenellus, at first proposed, to Barrandia, in honor of the author of the "*Système Silurien de Bohême*;" unfortunately overlooking the fact that Prof. M'Coy had proposed the same name for a genus of trilobites. As the later name is untenable, even if the genus proposed by M'Coy should be abandoned, I shall propose to return to the name Olenellus; retaining the views originally expressed as to the relations with Paradoxides and Olenus, the primordial types to which the new genus is allied.

PRELIMINARY NOTICE

OF SOME OF THE SPECIES OF CRINOIDEA KNOWN IN THE UPPER HELDERBERG AND HAMILTON GROUPS OF NEW-YORK.

CRINOIDEA.

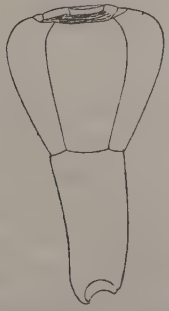
GENUS EDRIOCRINUS (HALL).

IN the third volume of the Palæontology of New-York*, I have proposed the name EDRIOCRINUS for some species of Crinoidea which are apparently destitute of a column, but which in their young state are affixed by their basal plates, and afterwards become free. One of the described species, in its earlier stages of growth, often occurs in groups of two or three individuals, firmly adhering to some foreign body by a broad base of attachment.

The species described are from the Lower Helderberg limestones and from the Oriskany sandstone.

In the limestone of the Upper Helderberg group there is a similar form, with more elongated base, which is sometimes rounded, and resembles a short column; but so far as I am able to determine from the specimens examined, the species is sessile, having the structure of those already described, without a jointed column.

1



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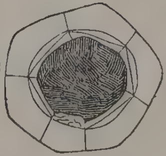

1. Figure of a specimen, natural size, showing base and first radial plates.
2. View of the summit of the specimen.

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* Palæontology, Vol. iii, p. 119.

EDRIOCRINUS PYRIFORMIS (n. s.).

General form elongato-pyriform or subclavate. Base elongate, subcylindrical, more or less attenuate, solid, or the plates closely anchylosed. Radial plates more rapidly expanding, giving a short turbinate aspect to the upper part of the body, contracting towards their superior margins, which are more or less abruptly bent inwards; the upper margins marked by two narrow grooves, for the insertion of the next series of plates.

Surface smooth or finely granulose-striate.

The specimens which I have examined are about an inch and a half in length, from the base to the summit of the radial plates. One specimen preserves a fragment of a single plate of the third series, but too imperfect to be of any value in determining the form. The base is usually concave: as if, in the living state, adhering to and clasping some cylindrical body.

Geological formation and locality. In the limestone of the Upper Helderberg group. Collected by E. Jewett and C. A. White, from Eastman's quarry south of Utica.

GENUS CHEIROCRINUS (Hall).

Thirteenth Annual Report of the Regents of the University, on the State Cabinet of Natural History.

CHEIROCRINUS CLARUS (n. s.).

Body of medium size and strength, a little flattened on the dorsal side below, and expanding slightly above. Column short, flexuous: joints in the lower part long, becoming shorter above; basal plate short, concave. First dorsal plate triangular, short, the base a little concave in the centre and straight on each side: dorso-lateral plates five-sided, large, a little thickened at the junction of the arm-plates; upper dorsal or dorso-radial plate short, five-sided, and supporting a single simple arm which is composed of rounded or subcylindrical plates about once and a half as long as wide. The second plate above the dorso-lateral plate is cuneate above, and supports two arms; while the lower plate of the ventral arm is likewise bifurcating, and sustains on its ventral slope a third arm; giving three lateral arms, each of which bifurcate several times, and all are composed of elongate cylindrical joints. [Other arms may exist on the ventral side, but they are not visible in the specimen examined.]

Surface finely papillose.

The specimen is essentially entire : the column is attached by a spreading root to the column of another crinoid. The column of the CHEIROCRINUS is about two and a half inches in length; while the length of the body and arms, when fully extended, has been about the same. From the position of the animal and the direction of its column, it appears to have been attached to the crinoid column while that body remained in a vertical position, or while the animal to which it belonged was in a living state. This seems the more probable, since, had it been attached to a fragment lying on the bottom, the pendant arms of the Cheirocrinus would have reached nearly or quite to the muddy sediment.

Geological formation and locality. In the shales of the Hamilton group: Ontario county.

GENUS ANCYROCRINUS (n. g.), HALL.

IN the shales of the Hamilton group, and in the limestone of the Upper Helderberg group, there occur numerous crinoidal bodies, which, at one extremity, have the form of a bulb or thickened column, with lateral ascending processes and a central ascending column of greater or less length.

Specimens of this character, in what appear to be incipient stages of growth, are like fragments of crinoidal columns, rounded and sometimes attenuated below, with a small articulating scar at the extremity : recognizing this as the base, there proceed from the sides obliquely ascending spine-like processes, of the character of a crinoidal column, but tapering to an obtuse point, or sometimes truncate. The central portion continues above these divisions, and is marked by the transverse joints, while the part below and the lateral processes are rarely thus marked.

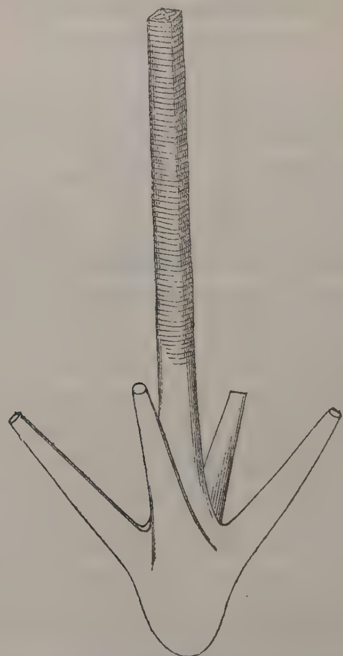
As the development progresses, this lower portion, and the part around and above the lateral processes, becomes enlarged and swollen in the form of a bulb. The central column above sometimes continues till the bulb acquires a comparatively large size; but often it separates, and the cicatrix becomes more or less obliterated and covered by calcareous accretion which sometimes assumes a concentric lamellose structure.

In the more perfect specimens the form is somewhat biturbinate, the base rounded and larger than the portion above the processes. In some of the forms the lateral processes are all nearly or quite in the same range, while in others they are unequal, and often one of them is considerably above the others at its origin.

No structure has been determined in these parts; and thus far we do not know the body, which we infer has been attached to the

summit of the column. The column is round in its lower part, sometimes becoming quadrangular above, and is unequal in its dimensions.

These bodies seem to have been the base, and indicate the existence of a free floating crinoid, with the thickened bulb below serving as a balance for the column and body above. The articulating scar on the lower extremity of the smaller ones indicates that the animal was fixed in its young state.



For these bodies and their appendages, a designation is required; and I have chosen that of Ancyrocrinus, indicating the anchor-like appendage of the column.

ARCYROCRINUS BULBOSUS (n. s.).

Bulbiform below, with four lateral, obliquely ascending processes of the character of jointed or solid spines, which are more or less thickened according to age. Column above the bulb often elongated, rounded in the lower part and obtusely quadrangular above in older specimens, which preserve but a small part of the column as a thickened process. Body and arms unknown.

The figure is from a specimen in the State Collection, which preserves about seven inches of the column above the bulb. The lateral processes are restored from another specimen.

Geological position and locality. In the shales of the Hamilton group : Lake Erie shore, and elsewhere.

ANCYROCRINUS SPINOSUS (n. s.).

Body biturbinate, smaller above; lower part rounded, swelling and sometimes ventricose. Lateral processes four, arranged at regular intervals and at nearly equal height from the base. The central portion above the lateral processes more or less elevated, rounded, and, in the young forms, extremely conical; the summit marked by a scar, but no column has been seen attached.

Geological formation and locality. Limestone of the Upper Helderberg group: Falls of the Ohio, and elsewhere.

GENUS PLATYCRINUS (Miller).

PLATYCRINUS ERIENSIS (n. s.).

Body small, cup-shaped: cicatrix for the attachment of column comparatively large, bordered by a thickened rim. Basal plates closely anchylosed, curving gently upwards: radial plates a little wider than high, and the suture marked by a sharp line. The centres of the plates become prominent above the middle, and terminate in a conspicuous articulation which occupies nearly one-third the width of the plate. First arm-joint quadrangular; the second pentagonal, giving a bifurcating arm: arm-joints strong, subangular, thickened at their extremities, and supporting on the upper angles strong jointed tentacula. Surface granulose.

This neat little species is scarcely more than three-sixteenths of an inch from the base to the origin of the arms, while the arms themselves have been more than three times as long. The strong subangular joints of the arms, and the strong tentacula, are marked characters.

Geological formation and locality. In the shales of the Hamilton group: near Hamburgh, Erie county, N.Y. Collected by C. A. White, 1860.

PLATYCRINUS EBORACEUS (n. s.).

Base large, spreading, consisting of three distinct plates, the suture lines marked by a narrow ridge: cicatrix for column attachment of moderate size, prominent, and very distinctly serrated on the edge. Entire surface finely granulose.

The width of the basal plates altogether is nearly an inch, while the elevation is only about three-fourths of an inch.

Geological formation and locality. In the shales of the Hamilton group: near York, Livingston county. Collected by C. A. White and R. P. Whitfield, 1860.

GENUS POTERIOCRINUS (Miller).

POTERIOCRINUS NASSA (n. s.).

Body turbinate : base comparatively broad, pentangular, with the column-scar strongly marked, and its angles corresponding to the sutures of the plates. Basal plates pentagonal, longer than wide, the lateral angles at the base a little prominent, corresponding to the form of the column : subradial plates hexagonal (except on the anal side) and subequal, nearly once and a half as long as wide; radial plates shorter than their width, hexagonal (except on the anal side), broadly truncate above, with the margin thickened for the attachment of the strong arm-plates. The subradial plates are prominent and subangular along the middle, and somewhat abruptly depressed at the sides.

Surface smooth or finely granulose.

Geological formation and locality. In the shales of the Hamilton group, near Canandaigua, N.Y. Collected by R. P. Whitfield, 1858.

POTERIOCRINUS NYCTEUS (n. s.).

Body turbinate : height and greatest width nearly equal. Basal plates a little longer than wide : subradial plates about one-fourth longer than wide : radial plates nearly twice as wide as long, prominent above, the upper margin thickened and projecting; a little depressed between the centre and the lateral margins, the latter slightly thickened at the suture line.

Arms bifurcating on the third joint from the base, composed of rounded joints which are once and a half as long as wide, contracted in the middle and swelling at the extremities : every second joint on the opposite sides give origin to armlets of similar character to the arms. The tentacula undetermined. Proboscis nearly three times as long as the body plates.

Plates on the anal side comparatively large, supporting on the upper margins the plates of one side of the strong elongate proboscis, hexagonal, wider than high, and gradually diminishing in size from the base. Upper anal plate, and plates of the proboscis, marked by radiating subangular ridges towards the margin. Plates of the body and arms striato-granulose, the striæ arranged in a radiating direction.

Column round, comparatively strong; the upper part composed of joints of unequal length, in a somewhat regularly alternating

order; and below this, of nearly equal joints which are about half as long as wide, with strongly crenulate margins.

Geological formation and locality. In the shales of the Hamilton group, Ontario county, N.Y. C. A. White, collector.

POTERIOCRINUS DIFFUSUS (n. s.).

Body small, turbinate. Basal plates small, about as long as wide : subradial plates less than one-fourth longer than wide, prominent in the middle : radial plates short, much wider than high, the upper margins thickened and projecting. Three plates are visible in the anal area, the lower one of which is subpentagonal, the two lower sides resting on adjacent subradial plates. The three lower arm-plates are wider than long.

Arms bifurcating on the third plate, giving ten arms, which are long and slender, widely diverging, composed of long cylindrical joints curving alternately on opposite sides, and giving a zigzag direction to the arms. Every second or third joint gives off armlets, which are composed of joints similar to those of the arms, but proportionally longer : intermediate joints shorter than those bearing the armlets. No tentacula proper have yet been observed.

Surface of the body granulose. Column round; the upper part consisting of thicker and thinner joints, with the edges rounded.

Geological formation and locality. In the shales of the Hamilton group, Ontario county, N.Y. C. A. White, collector.

POTERIOCRINUS NEREUS (n. s.).

Body small, subpentagonally turbinate. Basal plates short, minute, forming a narrow rim about the base of the body : subradial plates longer than wide : radial plates shorter than the subradials, thickened at the upper margins. First arm-joint short; second one much longer, and thickened at the extremities. Arms bifurcating on the second joint from the radial plate; the joints nearly twice as long as wide, rounded and thickened at the extremities, and giving origin to slender jointed tentacula. Surface granulose or granulose-striate, sometimes apparently smooth.

Column obtusely subpentangular near the base of the body, and composed of joints of unequal thickness.

Geological formation and locality. In the shales of the Hamilton group, Ontario county, N.Y. Collector C. A. White.

POTERIOCRINUS VERTICILLUS (n. s.).

Body elongate, clavate or subfusiform; the height to the top of the first radial plates equal to twice the greatest transverse diameter. Basal plates elongate, about twice as high as wide, gradually expanding from below; their upper ends obtusely pointed. Subradials half as high again as wide, three hexagonal and two heptagonal. First radials half as large as the subradials, a little wider than high, pentagonal and hexagonal. Second radials, or first arm-plates, small, little more than half as wide as the first radials, quadrangular. Four anal plates are preserved in the specimen; the first small, quadrangular, resting obliquely upon two subradials, and its upper margins placed against the lower lateral angles of a first radial and the second anal plate : second and third anals larger, resting between the first radials of the adjacent rays; fourth one small, about equal to the second radials, and resting directly on the top of the third anal plate. Arms unknown.

Surface of plates smooth or finely granulose. Column round, of medium size, composed of rather strong plates, which are somewhat unequal near the junction with the body.

This species is closely related to *P. fusiformis* of the Burlington limestone, in general form and structure, but differs in the proportions of the plates, especially of the first arm-plates, which in that species are very long.

Geological formation and locality. In the shales of the Hamilton group: Ontario county. C. A. White, collector.

POTERIOCRINUS INDENTUS (n. s.).

Body less than medium size, broadly calyculate or subturbinate, gradually spreading to the top of the first radials. Basal plates low, less than one-fourth of the entire height of the cup, very obtusely pointed at the upper end. Subradials proportionally large, height and breadth subequal; three hexagonal and two heptagonal, the latter largest. First radials of moderate size, a little wider than high, pentagonal, with the upper angles bent inward, giving them the appearance of being heptagonal. Cicatrix for the arm-attachment extending two-thirds across the plate. Four anal plates preserved; the first one is largest, pentagonal, resting between two subradials and the first radial plates : second anal plate smaller, resting on the top of the largest subradial; third and fourth anal plates small.

Surface marked by strong indentations at each angle of the plates, giving an elevated appearance to the space on the border of the plate between the angles, forming ridges which join across the sutures of the plates. Column long, proportionally strong, composed of very unequal plates alternating with each other.

Geological formation and locality. In the shales of the Hamilton group: Ontario county. C. A. White, collector.

CYATHOCRINUS (SUBGENUS?).

CYATHOCRINUS BULBOSUS (n. s.).

Body small, nearly hemispherical, forming a bulb-like projection at the base of the strong expanded arms. Basal plates minute: subradials of moderate size, four hexagonal, one heptagonal. First radials larger than the subradials, broad, short, pentagonal. Anal plate elongate, quadrangular. Arms spreading horizontally from the body, proportionally strong and massive, composed of short broad plates with outer margins slightly elevated. In some rays the first bifurcation is upon the third plate, in others at greater distances, and varying in different specimens: in one specimen, it occurs on the eleventh plate of one ray. Above the first, there are generally about three other bifurcations in the main division, and the branches divide at irregular distances, giving ten to fifteen branches to each ray.

The terminal plates of the outer divisions are thin, and obtusely pointed. The lateral diameter of the arm-plates is about double that from the outer to the inner faces. Inner face of the arms strongly grooved. The scars for the attachment of tentacula have not been observed.

The body is proportionally very small, the arms spreading an inch and a half on each side. The column (if any) has been extremely small, as no cicatrix for its attachment has been observed. The arms in all the specimens are expanded, and this appears to have been the normal condition.

The structure of the body, being identical with that of Cyathocrinus, offers no means of separation from that genus; but the strong expanding and broadly grooved arms are unlike any of its known species.

Geological formation and locality. In the limestone of the Upper Helderberg group: Livingston county, N.Y.

GENUS FORBESIOCRINUS (De Koninck).

FORBESIOCRINUS LOBATUS (n. s.).

Body less than the medium size of the genus, spreading somewhat abruptly from the base to the third radial plates, from which the arms rise almost vertically. Basal plates small and short, forming a narrow ring around the base : subradial plates short, pointed above ; rays prominent : radial plates abruptly bent inward at the sides, the upper margins deeply sinuate for the reception of the patelliform plate of the next superior joint; the third radial marked by a prominent central node near its upper margin. Interradial spaces deeply depressed, with numerous interradial plates. Arms bifurcating on the third radial plate, and again two or three times above this. Surface finely granulose.

The length of the body and arms (which are incurved at the summit) is a little more than one inch.

This species bears considerable resemblance, in general form and proportions, to the *F. giddingi* of the Carboniferous limestone.

Geological formation and locality. In the shales of the Hamilton group, Ontario county, N.Y. C. A. White, collector.

FORBESIOCRINUS NUNTIUS (n. s.).

Body pentalobate below, subturbinate, regularly spreading from the base to the free arms. Basal and subradial plates rudimentary, the latter barely visible beyond the column-facet. The primary radial series consists of three plates, which increase rapidly in width from the lower one : interradial and anal plates apparently none. Secondary radial series three, decreasing in width from below upwards; the last one a bifurcating plate. On one ray the arm bifurcates on the fourth plate, while the other division is simple to the sixth plate, the seventh being apparently a bifurcating plate.

Surface strongly granulose or papillose, with a median ridge on the centre of the plates, and a strong, short, obtuse, ascending spine at the centre of the bifurcating plate.

The upper part of the column is round, enlarging upwards, and composed of thin joints so characteristic of the genus. The marks of the overlapping patelliform plates are well preserved in the rays.

The close resemblance between this species and the *O. thiemei* of the Burlington limestone is very remarkable. It differs in the character of surface and in the divisions of the ray, which are regularly bifurcated

three or more times, while in the *O. thiemei* there are no true bifurcations above the second one. The specimen is imperfect in its upper part.

Geological formation and locality. In the shales of the Hamilton gronp, associated with *Platycrinus eriensi, Spirifer granuliferus, S. mucronatus, Strophodonta demissa, Orthis penelope,* and other characteristic Hamilton fossils : Erie county, N.Y. C. A. WHITE, collector.

GENUS RHODOCRINUS (MILLER).

[SUBGENUS] ACANTHOCRINUS? (RŒMER).

Admitting the formula of RHODOCRINUS as now generally adopted among authors, which recognizes five basal plates instead of three as given by MILLER, the genus will include several forms heretofore referred to other genera. The formula given by DE KONINCK is as follows :

Basal plates, 5;
Subradials, 5;
Radials, 3 × 5;
Brachials, 1 or 2, soldered to or forming part of the calyx;
Interradials, 6 to 8 × 4;
Anals, 10 to 12;
Interaxillaries, 1 × 5;
Arms 10 to 20, bifurcating two or three times.

Adopting this formula without other restrictions, we include those forms with five rudimentary or undeveloped plates, as THYSANOCRINUS and LYRIOCRINUS of the Niagara group, as well as OLLACRINUS, GILBERTSOCRINUS and ACANTHOCRINUS, where the basal plates are developed.

In the simpler forms of RHODOCRINUS, we have the three radial plates, succeeded by one or two pairs of secondary radials or brachial plates below the arm openings; with arms in pairs, with or without bifurcations; and a simple interradial series of six or eight plates, uniting with those of the rounded dome.

These forms, which are usually globose or subglobose, begin their existence in the Lower Silurian strata, and continue through intermediate formations to the Carboniferous limestone.

In THYSANOCRINUS we find a departure from those just noticed, which include some of the typical forms of the genus. The described forms of THYSANOCRINUS are not globose, but turbinate; the basal plates rudimentary; the arms usually bifurcating from their origin; the interradial plates usually three, with a single axillary or interbrachial plate. The character of the dome is not well determined :

in some, there seems reason to infer the existence of an elongate proboscis.

In LYRIOCRINUS we have a subglobose body, with the basal plates extremely rudimentary, and not noticed in the original generic description, though since proved to exist. The interradial plates are four or five, with a single interbrachial plate; the arms rising in pairs from each ray, and continuing simple to their extremities. Dome unknown.

In ACANTHOCRINUS, the basal plates are developed beyond the column; the subradials and first radials bear nodes or spines. The rays divide on the third radial, and each division has three supraradials below the free arm-plates. In the typical species of this genus by RŒMER, there are shown about fifteen interradial plates and several interbrachial plates.

In the Hamilton group we have at least two species, which, preserving the formula of RHODOCRINUS, have nevertheless an unusual form for species of that genus, and approach the ACANTHOCRINUS in some of the more important features. I have therefore referred them, for the present at least, to that genus or subgenus of RHODOCRINUS. In the same association we find a single globose form of RHODOCRINUS, with the arms in pairs surrounding the low dome.

RHODOCRINUS (ACANTHOCRINUS) NODULOSUS (n. s.).

BODY short, turbinate : height and greatest width about equal. Basal plates pentangular, well developed, and separating the subradial plates from the column-area. First radial plates pentagonal, or sometimes with one of the lower angles truncate, giving an irregular hexagonal form. Second radials hexagonal, wider than high. Third radials pentagonal, or sometimes unequally hexagonal. The rays bifurcate, and have three or four simple plates in each of the secondary radial series; above which, they become a double series of pentagonal arm-plates. Arms bifurcating, becoming free at the fifth, sixth, or seventh range of plates above the supraradial series, and again bifurcating a second and a third (and perhaps a fourth) time; the bifurcations widely divergent. If the rays are equal, the entire animal had at least forty arms.

INTERRADIAL series consisting of fifteen or more plates, the first one much larger than either of the others. Interbrachial series consisting of about twelve plates. Column, at the base of the body, large and round, with a pentangular cavity.

SURFACE of the subradial and first interradial plates distinctly no-

dose in the middle, with obsolete ridges radiating to the margins of the plates : radial plates elevated but not nodose in the centre, and with the radiating ridges well defined towards the margins. Interradial plates (above the first one) and interbrachial plates strongly nodose.

This species has the aspect of one of the larger forms of Forbesiocrinus; the height from the base to the first division of the ray being nearly one inch, and thence to the second bifurcation nearly three-fourths of an inch.

Geological formation and locality. In the shales of the Hamilton group: Ontario county, N.Y. C. A. White, collector.

RHODOCRINUS (ACANTHOCRINUS) GRACILIS (n. s.).

Body small, turbinate : rays prominent; base small, pentalobate, as is the upper part of the column. Basal plates small, but distinctly developed beyond the column-facet : subradial plates small; first radial plates comparatively large; second and third radials a little smaller; second radials two or three, below the first bifurcation of the arms. One division of the ray bifurcates once, the other twice; giving five arms from a single ray. Arms simple, slender, composed (near the base) of a single series of plates which are wider on one side, but finally composed of a double series of wedgeform plates. Interradial plates small, subnodose or tuberculose, about twelve or more visible in each series. Interbrachial or interaxillary plates minute, undetermined.

This species likewise bears a resemblance to Forbesiocrinus in the prominence of the rays, and in the numerous small plates of the interradial areas. The arms bifurcate only near the base; and in this respect, it differs conspicuously from the preceding species.

Geological formation and locality. In the shales of the Hamilton group: Ontario county. C. A. White, collector.

RHODOCRINUS SPINOSUS (n. s.).

Body subglobose : height and breadth about as two to three; base concave; basal plates covered by the column. Subradial plates large, the lower half bending abruptly into the basal depression : first radial plates comparatively large, heptagonal; second and third radials smaller, the third one a bifurcating plate which gives origin to two simple arms.

Interradial series consisting of seven or more plates; the first one large and hexagonal, sustaining three smaller ones. Interbrachial series of one or more plates. The subradial, first radial, and first interradial plates large and convex, with a strong spine proceeding

from the centre of each one. The spines from the radial and interradial plates are as long as the height of the body: the spines of the subradial plates of similar character.

The second and third radials are marked by a longitudinal ridge, which bifurcates on the upper plate. The interradial plates are marked by central ridges, with defined ridges extending to the margins of the plate. The first radial and first interradial plates are broadly undulating; the elevated parts extending from the sides of the plate, and the depressions towards the angles. Arms elongate, subcylindrical, composed of short joints which are narrowly grooved on the inner side, and furnished with jointed tentacula.

This little species is most remarkable in the strong elongate spines, which are much more extreme than in any species heretofore observed.

Geological formation and locality. In the shales of the Hamilton group: Ontario county. C. A. White, collector.

GENUS TREMATOCRINUS (Hall).

TREMATOCRINUS SPINIGERUS (n. s.).

Body small, urnshaped, inflated in the lower part, constricted above the middle and again spreading at the top, forming a rim-like expansion at the base of the arms. Summit concave: base impressed; the cavity embracing the basal and subradial plates. First radial plates large, forming the base of the cup: plates of the antero-lateral and postero-lateral rays uniting with each other by the lateral edges; the others separated by the first interradial and first anal plates of the corresponding areas, which truncate and rest upon the subradials. Second radials but little smaller than the first, hexagonal. Third radials smaller than the second, heptagonal; the upper cuneate edge supporting the superradials, from the second of which rise the true arms: these are long and slender, rounded on the back, and in the lower part consisting of short plates, bifurcating on the fifth plate; above this, they are composed of short cuneiform plates, arranged like those of true Poteriocrinus.

Interradial spaces occupied by fifteen or sixteen small plates, and enclosed at the top by the summit-arms, which are proportionally strong in the lower part and composed of a double series of semi-elliptical plates to the fourth pair, where they bifurcate, forming a pair of slender cylindrical processes. The entire length of these arms is about one-fourth greater than the height of the whole body.

ANAL area larger than the interradial, and occupied by a greater number of plates; not limited above by a single summit-arm like those, but opening to the dome, and having a more slender summit arm arising from each side : these arms are composed of four ranges of small plates, the range on the lower side largest. This arrangement gives six summit-arms, instead of five as in the other species of this genus.

SURFACE of plates finely granulose.

THE first and second radials bear on their centres long spines. The plates of the radial series are elevated above the arms, giving (in a basal view) a pentalobate form to the body. Summit composed of numerous very small plates, and ornamented by several lozenge shaped depressions as in the typical forms of the genus.

The lateral or true arms, in this species, present some differences of structure and mode of attachment from those observed in one of the typical species of the genus. The arm-plates originate on the second supraradial, and are alternately wider on one side. Each arm bifurcates on the fifth plate above its origin, and continues undivided as far as the eighth plate above this, having the character of the arms of CYATHOCRINUS or POTERIOCRINUS; while those observed in the Carboniferous species appear like slender and pendulous tentacula. Better specimens of the latter, however, are required to determine these characters in detail.

Geological formation and locality. Shales of the Hamilton group : Ontario county. C. A. WHITE, collector.

GENUS ACTINOCRINUS (MILLER).

ACTINOCRINUS NYSSA (n. s.).

CALYX hemispherical, with a tripartite rim surrounding the base, formed by the projection of the lower margin of the basal plates. Column-cicatrix of moderate size, scarcely depressed. First radial plates of medium size, the upper and lower lateral faces subequal. Second radials a little smaller than the first, somewhat regularly hexagonal. Third radials smaller than the second, heptagonal, supporting still smaller hexagonal supraradials on the upper margins : these again support a brachial plate, with a single arm on the outer face and a secondary supraradial on the inner face : this again supports a brachial and single arm on the inner face, and a series of three supraradials of the third order on the outer face, the upper one of these supporting an arm on each side; giving four arms to each main division of the ray, or eight arms to each ray = 40 arms.

Arms long and slender, composed of a double series of very narrow short plates, interlocking on the back of the arm (which is there slightly grooved) and angular on the edges. Each plate gives support to a series of slender jointed tentacula, with a node or short spine on the outer surface of each joint.

Interradial spaces occupied by five, seven or more plates; the first equal in size to the second radials, hexagonal, and supporting two in the second series : two or three plates in the third and fourth series. Intersupraradials two or three between the main divisions of the ray. Anal area much larger than the interradial area, and occupied by a greater number of plates in ranges of 1, 3, 9, 5, respectively; above which, they are irregularly placed.

Surface of plates marked by a single set of rounded ridges, forming pointed nodes in the centres; those traversing the radial series the stronger and more elevated. Dome elevated; the plates bearing a spine upon the centre of each.

Geological formation and locality. In the shales of the Hamilton group: Western New-York. C. A. White, collector.

ACTINOCRINUS EUCHARIS (n. s.).

Calyx somewhat larger than the medium size, broadly turbinate, a little inflated in the lower part, with a thin trilobed rim at the base of the cup, formed by the lower margin of the basal plates. Basal plates low : first radials rather large, with large superior lateral margins; second radials much smaller, hexagonal; third radials less than two-thirds as large as the second, pentangular, supporting on each of the upper sloping edges a primary supraradial of nearly equal size. These, on their outer sides, support a series of three brachials, and on the inner a secondary supraradial: this supports brachials on each of its upper faces, giving six divisions to each ray before the arms become free; while the central branch of each main division again bifurcates after becoming free, giving a formula of

$$\frac{8}{8}\overset{8}{\text{—}}\frac{8}{8} = 40 \text{ arms.}$$

Interradial spaces large, occupied by ten or eleven plates each; the first one equal in size to the second radial, hexagonal, and supporting two smaller plates in the second range, one hexagonal and one heptagonal, with three in the third range, two in the fourth and fifth, and sometimes a small plate above. Intersupraradials three or more between the main divisions of the ray.

Anal area much larger than the interradial area, and occupied by

a greater number of plates : the first one equals in size the first radial, and supports three in the second range, with five in the third range; above which, the arrangement cannot be well determined.

Surface of plates marked by radiating ridges, which form, with those from adjoining plates, a series of isosceles triangles : in the lower part of the cup they are a triple series, and in the upper part a single series. The ridges which traverse the ray are stronger, and form a sharp carina, with strong nodes on the second radial plates; while on the centres of all the other plates are low angular nodes.

This species differs from *A. nyssa* in the form of the cup, in the surface characters, and in the divisions of the rays, which take place lower down in the calyx. It bears considerable resemblance to *A. tenuis* of De Koninck (*Monograph*, pa. 128, pl. ii, f. 3).

Geological formation and locality. In the shales of the Hamilton group: Western New-York. C. A. White, collector.

ACTINOCRINUS PRÆCURSOR (n. s.).

Body small, short, subglobose, truncate at the base. Basal plates small, depressed below for the reception of the column. First radial plates proportionally large, much wider than high. Second radials less than half the size of the first, quadrangular. Third radials very small, subtriangular, with the lateral angles scarcely truncate; the upper sloping margins supporting an arm on one side, and on the other two supraradials, the upper one of which supports two arms; giving three arms to each ray.

Interradial areas consisting of three plates each ; the first of moderate size, supporting two small ones in the second range, above which the plates more properly belong to the dome. Anal plates ten or more; the first little more than half as large as the first radial plates, supporting three in the second series and five in the third, with small plates above, uniting with those of the dome.

Arms strong, composed of a double series of short plates, each of which has an elevated ridge in the middle, giving a very rugose structure to the arm.

Surface of body-plates elevated, and roughened by confluent granulæ. The dome is imbedded in rock, and not determined.

This species is of the type of *A. unicornis* of the Burlington limestone (Carboniferous), and strongly resembles it in the calyx and arms; differing in some details of structure, and in surface characters.

Geological formation and locality. In the shales of the Hamilton group: Western New-York. C. A. White, collector.

ACTINOCRINUS CAULICULUS (n. s.).

Body small. Calyx broadly cupshaped, approaching hemispherical, with a thin projecting rim around the base; somewhat pentalobate in a basal view, from the protrusion of the arm-bases and plates of the radial series. Basal plates of moderate size, low, projecting at the lateral margins. First radial plates proportionally large, wider than high. Second radials small, pentagonal or hexagonal, as wide as high. Third radials a little larger than the second, pentagonal or heptagonal, supporting on each upper sloping edge two supraradial plates of moderate size, one above the other : the upper one of these is a bifurcating plate, and gives origin to two arms, making four arms to each ray = 20 arms.

Interradial plates three in each series; the first one hexagonal, wider than high, supporting two smaller plates in the second range : above this, they are more properly dome-plates. First anal plate nearly equal in size to the first radial, heptagonal, supporting three small plates in the second range, with a still larger number in the third range.

Arms becoming free above the third radial plate; composed in the lower part of cuneate plates, and, above, of a double series of interlocking plates, their length a little less than the breadth of the arm, and their surfaces beautifully ornamented by granules and small curving ridges.

Surface of plates marked by a single set of low, rounded, radiating ridges, which unite with those of the adjoining plates at the sutures, and, meeting in the centres of the plates, they form rounded or angular nodes.

This species differs from either of the preceding in the structure and number of the arms. In the arrangement of the calyx-plates, it is closely related to *A. nyssa*; but it is a smaller species, and differs in the number of the arms.

The four preceding species are remarkably similar to Carboniferous forms of the genus; and, aside from their well authenticated geological associations, would in themselves offer no means of separation from the Crinoidea of the Carboniferous fauna.

Geological formation and locality. In shales of the Hamilton group: Western New-York. C. A. White, collector.

ACTINOCRINUS CALYPSO (n. s.).

Body of medium size, somewhat narrowly turbinate to the bases of the free arms. Basal plates proportionally large, with a somewhat small column-facet. First radial plates of moderate size, with upper and lower lateral margins subequal. Second radials about half as large as the first, hexagonal. Third radials much smaller, pentagonal, the upper lateral angles slightly truncated; the upper sloping sides each supporting a series of two small supraradial plates: from the upper one of these rise two arms in the anterior and antero-lateral rays, giving four arms to each of these rays. The postero-lateral rays are probably the same, which would give an arm-formula of

$$\frac{\overset{4}{4 - 4}}{4 \quad 4} = 20 \text{ arms.}$$

First interradial plate intermediate in size to the first and second radials, hexagonal; supporting two smaller hexagonal or heptagonal plates in the second range, with a larger number of very small plates above, meeting with those of the dome. Anal area not determined.

Arms round, slender, twice or twice and a half as long as the height of the cup, composed of a double series of very short interlocking plates, each of which bears a long tentacle composed of very long joints.

Surface of plates marked by low, distinct, rounded, radiating ridges, from one to four at each margin, most numerous at the base and decreasing upwards. A strong rounded ridge commences at the upper margin of the first radial plate, and extends through the middle of the ray to the base of the free arms, where it equals them in size, and is longitudinally marked by granulose striæ.

This species differs from *A cauliculus* in the surface markings; while the arm-formula, as well as the arm-structure, appear to be alike in both: it also differs from that species in the form and relative height of the basal plates.

Geological formation and locality. In the shales of the Hamilton group: in Western New-York.

ACTINOCRINUS POCILLUM (n. s.).

Body regularly hemispherical below the arms. Base with a comparatively large depression for the column-attachment, and a low rounded tripartite rim formed by the thickening of the basal plates. First radial plates of moderate size, wider than high. Second radials much wider than high, hexagonal. Third radials smaller than the second, broadly pentagonal or heptagonal; supporting on each upper sloping face, in the anterior and postero-lateral rays, a single supraradial plate, which gives origin to an arm on each side, making four arms to each of these rays. In the antero-lateral rays, those plates support an arm on each side, giving only two arms. This makes a brachial formula,

$$\frac{2\overset{4}{-}2}{4-4} = 16 \text{ arms.}$$

First interradial plate large, hexagonal; supporting two smaller plates in the second range, with still smaller ones in the third, uniting with the dome-plates. First anal plate smaller than the first radials, heptagonal; supporting three smaller plates in the second range, five in the third, and still more in the fourth, the plates in each series smaller than in the preceding one. Arms round, slender, with two bifurcations, composed of two series of short plates interlocking on the back; the upper edges elevated, producing a somewhat imbricate appearance, with granulose surface.

Surface of plates marked by four small lozenge-shaped elevations, covered by very fine radiating striæ. These raised portions of the surface occupy a triangular space on each side of the sutures between adjacent plates, so that there are as many of these elevations surrounding each plate as there are sides to the plate: the centres of the plates are also slightly elevated.

Geological formation and locality. In the shales of the Hamilton group: Western New-York. C. A. White, collector.

ACTINOCRINUS: Subgenus MEGISTOCRINUS (Owen).

MEGISTOCRINUS DEPRESSUS (n. s.).

Body rather large, broadly spreading, shallow. Dome depressed, with strong deep constrictions or depressed areas between the rays and their divisions, reaching to the centre, which is ornamented with a strong spine: five other spines are at the junction of the ridge, marking the divisions of each ray, about halfway from the centre

to the periphery, making six in all. A somewhat strongly elevated aperture is situated in the depression corresponding with the anal series. Basal plates small, extending but little beyond the cicatrix of the column. First and second radial plates about equal in size, the latter regularly hexagonal. Third radials smaller, heptagonal; supporting on each upper sloping face (in the anterior and postero-lateral rays) a hexagonal or heptagonal supraradial plate, with brachials on each of its upper faces, giving four arm-bases to each of these rays; while in the antero-lateral rays they support the brachials, giving only two arms : this makes the formula,

$$\overset{4}{\overline{\frac{2 \quad 2}{4 \quad 4}}} = 16 \text{ arms.}$$

Interradial series consisting of eight to ten medium-sized plates and three to five smaller ones, which unite with those of the dome : the first is largest and hexagonal, supporting two hexagonal plates in the second range, three in the third range (one of which is hexagonal and two pentagonal), two in the fourth range of unsymmetrical form, and above this the smaller ones irregularly placed.

Anal area much larger than the interradial area, composed of twenty plates (more or less), the first about equal to the first radials, and supporting three in the second range; above this, irregularly arranged. In the four-armed rays, there are about three interbrachial plates; and in the two-armed rays, one plate. Arm-bases spreading in compressed lobes around the margin of the cup formed by the interbrachial constriction of the dome. Dome composed of numerous polygonal plates, which are much smaller than the body-plates.

Surface of body-plates marked by fine radiating striæ. In old specimens, the plates of the lower part of the calyx are thickened just within the margins.

This species differs from others in the deep constriction of the summit, and in the strong spines; while its extremely depressed form is likewise characteristic.

Geological formation and locality. In the shales of the Hamilton group: Western New-York. C. A. White, collector.

MEGISTOCRINUS ONTARIO (n. s.).

Body rather large, broad cupshaped. Dome depressed-convex, with a small subcentral proboscis situated a little nearer the anal side; composed of numerous small polygonal plates, which are raised in low rounded ridges, commencing about midway between the proboscis and the margin and extending to the inner side of the arm-bases, one to each division of the ray, becoming stronger towards the margin. These ridges are ornamented by small spines, of which there are three to the anterior ray and each of the postero-lateral rays, and one to each of the antero-lateral rays, and a central one just anterior to the proboscis.

Base flattened : basal plates small, barely extending beyond the circumference of the column. Plates of the primary radial series subequal or slightly diminishing in size from below upwards, somewhat elongate; the third one supporting supraradials on each upper face, with brachials on each of the upper sloping faces in the anterior and postero-lateral rays; while in the antero-lateral rays, they sustain brachials, giving only two arms to each of these rays and four to each of the others, making an arm-formula

$$\frac{\frac{2}{4}\overset{4}{}\frac{2}{4}}{} = 16 \text{ arms.}$$

Interradial spaces consisting of eighteen or twenty plates each : there are from one to three small interbrachial plates between each division of the rays. Anal plates numerous, from thirty-five to forty : the first nearly as large as the first radial plates, sustaining three smaller ones in the second range and five in the third; above which, they are not so regularly arranged.

Surface of plates marked by fine radiating confluent striæ, which give a beautiful sculpturing to the centres. The plates of the calyx are depressed.

Arms at their base strong, composed of a double series of interlocking plates. Column round, strong, with very unequal joints.

This species differs from the preceding in the greater depth of the calyx, the more elevated and less deeply grooved dome, and in the more numerous and smaller spines. It also possesses a subcentral proboscis, instead of only a prominent anal aperture. The sculpturing of the plates is of a different character, and the surface of the plate depressed with prominent margins almost the reverse of *M. depressus*.

Geological formation and locality. In the shales of the Hamilton group: Western New-York. C. A. White, collector.

GENUS CACABOCRINUS (Troost, Catalogue).

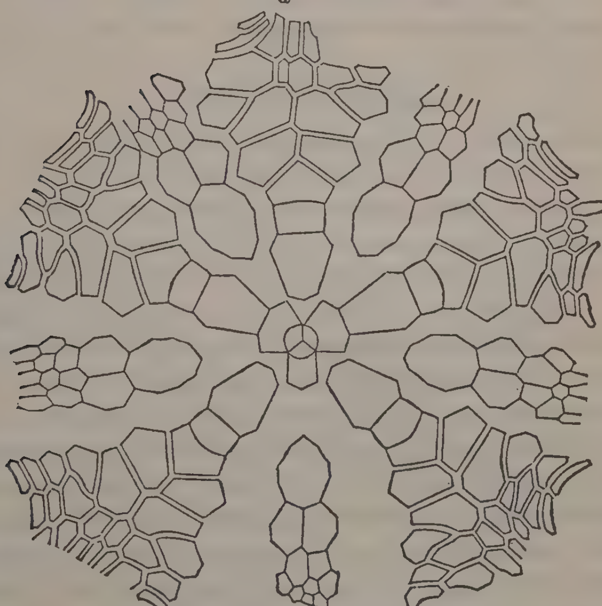
DOLATOCRINUS? (Lyon).

The generic formula of this genus, according to the typical species of the author, is as follows :

Basal plates, 3;
Radials, 5 × 3;
Radials of the second series, or supraradials, 10 × 1 or 2;
Interradials, 1 to 10 or more.
Anal area not distinguishable from the interradial areas.

Cacabocrinus (Diagram of the typical species).

a



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CACABOCRINUS SPECIOSUS (n. s.).

Body of medium size, oblate or depressed-spheroidal, with strongly protruding arm-bases. Dome moderately elevated, with a short obtusely pointed spine, at the base of which is a somewhat large anal aperture. Basal plates small, entirely concealed within the basal depression. First radial plates large, the inner margins bending into the basal depression. Second radials much smaller, quadrangular, a little wider than high. Third radials wider than the second, short, pentagonal; supporting upon each sloping side a series of three plates, one above the other : upon the upper of these, rest the first arm-plates.

INTERRADIAL series consisting of three or four plates arranged one above the other : the first very large, heptagonal; the second pentagonal or hexagonal; the third and fourth small; the upper one is placed between the arm-bases. Dome-plates numerous, variable in size and form.

ARMS two from each ray, unknown except near the base.

SURFACE of plates not rising above the general convexity of the body, except a strong sharp carina or ridge which traverses each ray from the edge of the basal depression to the base of the free arms, bifurcating on the third radial plate : this carina is strongest at its origin and on the second radial plate.

Geological formation and locality. In the limestone of the Upper Helderberg group : Schoharie, and elsewhere in New-York.

CACABOCRINUS TROOSTI (n. s.).

BODY of medium size. Calyx subhemispherical, moderately depressed at the base. Basal plates a little more in diameter than twice that of the column. First radials wider than high. Second radials quadrangular, twice as wide as high. Third radials short and broad, pentangular, a little larger than the second; supporting upon each upper edge a series of two supraradials; the upper one wedgeform above, and giving origin to an arm on each side.

FIRST interradial plate equal to or larger than the first radial, ten- or eleven-sided, irregularly subovate; supporting two or three small elongate plates above, which are followed by another range of still smaller plates between the arms of the adjacent rays. Intersupraradials, one between the main divisions of the ray.

ARMS long, slender, round on the back, composed of a single series of joints which are about once and a half as wide as high. Each plate bears upon the lateral edges long slender jointed tentacula. The arms are four from each ray at their origin, bifurcating twice and sometimes three times above.

From the middle of the first radial plate to the origin of the free arms, the plates of this series are traversed by an abruptly elevated rounded ridge. The surface of all the calyx-plates marked by radiating and parallel lines of granulæ. Longitudinal confluent striæ mark the arms in well-preserved specimens.

This species differs from the preceding in the form of body, in the surface markings, and in having the basal plates external to the column-facet.

Geological formation and locality. In the shales of the Hamilton group: Western New-York. C. A. WHITE, collector.

CACABOCRINUS LIRATUS (n. s.).

Body large, oblate or depressed-spheroidal, somewhat lobed at the top of the calyx, and on the summit by the arm-bases : base flattened. Basal plates depressed for the column-facet, which is about one-half their diameter; the depression bounded by an elevated rounded rim. First radial plates large. Second radials about half as large as the first, broad, quadrangular. Third radials about equal to or a little smaller than the second, much wider than high, pentangular; supporting upon each upper margin two large supraradial plates, one above the other : upon the upper one rests the first arm-plate.

Interradial series consisting of two or more plates; the first one very large, somewhat elongate, nine-sided; the second resting upon the first, irregular, wider below, and reaching to the centre of the arm-bases : sometimes there is an irregular plate on one or both sides of this second interradial, between it and the second supraradial. Dome moderately convex, strongly lobed; the lobes corresponding with the rays, composed of rather large plates, some of them subspinose, with a subcentral proboscis of medium strength.

Surface of calyx-plates marked by several parallel sets of strong elevated striæ, the longest radiating from the centre, where they form a low angular node : they unite with those from adjoining plates, crossing the sutures at right angles. On different parts, these sets vary from two to five or six. A stronger ridge passes along the centre of each ray, rising from the edge of the central depression of the basal plates, bifurcating on the third radial, and extending to the arm-bases.

Arms two from each ray at their origin, with strong bases, composed of a double series of short interlocking plates.

Geological formation and locality. In the shales of the Hamilton group: at several localities in Western New-York. C. A. White, collector.

CACABOCRINUS LIRATUS, *var.* MULTILIRA.

This form is similar to the preceding, but more oblate, with more spreading cup and proportionally larger column : the depression in the basal plates is less, and the surface-markings more evenly developed and more numerous, having from three or four to nine striæ on each face of the plate, and the small triangular areas within the sets marked by distinct granules. The ridges traversing

the centres of the plates of the rays are proportionally less developed.

In single individuals, this form, when compared with the preceding, might be regarded as a distinct species.

Geological formation and locality. In the shales of the Hamilton group: Western New-York. C. A. White, collector.

CACABOCRINUS GLYPTUS (n. s.).

Body large, very depressed-spheroidal. Dome elevated and terminating in a subcentral process, strongly lobed at the arm-bases. Base flattened: basal plates of medium size, mostly covered by a large column. First radial plates large, much wider than high. Second radials quadrangular, little more than half as high as the first, twice as wide as high. Third radials pentangular, a little longer than the second, once and a half as wide as the greatest height; supporting upon each upper margin a series of two supraradials, the first twice as large as the second, which supports the first arm-plates.

First interradial plate large, subcircular, nine-sided, supporting one hexagonal plate less than half as large as the first radial: three plates in the third series, the central one uniting with the dome-plates, and the two smaller plates resting partly upon the lateral margins of the second interradial, and partly upon the lateral margins of the first supraradials; these aid in supporting the second supraradials and first arm-plates.

Arms two from each ray at their origin, the bases strong and protruding.

Surface of calyx plates marked by interrupted lines of nodes, principally radiating from the centre to the angles. A sharp carina passes along the centre of each ray from the basal plates to the arm-bases, rising in angular nodes on the centre of each plate: sutures channelled.

This species differs from the preceding in the proportions of the plates: the first interradials are shorter, the arm-bases somewhat longer and more protruding; while the surface is marked by a few lines of nodes from the centres of the plates to the angles, instead of numerous and continued striæ passing at right angles to the faces.

Geological formation and locality. In the shales of the Hamilton group: near Pavilion, Genesee county.

CACABOCRINUS GLYPTUS? *var.* INTERMEDIUS.

This form has the general proportions and structure of *C. glyptus*, but with a more elevated dome (many of the dome-plates with a distinct node on the centre), and more deeply lobed between the rays. In surface characters, the lines are only from two to four in number, crossing the different margins of the plates; while on some of the centres they form nodes, with several smaller surrounding nodes. The ridge marking the radial series is but little developed in the lower part, but strongly in the upper, rising in nodes on the centres of the plates : those of the third radials are prominent, and triangular in form.

Regarding these variations as too marked to unite this form with the preceding species, I have designated it as a variety, possessing characters intermediate to *C. liratus* and *C. glyptus*.

Geological formation and locality. In the shales of the Hamilton group: Livingston county. C. A. White, collector.

CACABOCRINUS LAMELLOSUS (n. s.).

Body large, broad, spreading horizontally to the top of the third radial plates. Basal depression for the column-attachment large, deep, subcircular, embracing the basal and lower third of the first radial plates. First radials large, broad near the upper end; upper lateral margins short. Second radials short, broad, quadrangular. Third radials larger than the second, broad, pentangular; the upper margins long, supporting nearly as large supraradials. These are cuneate above, and support on each upper side a series of two secondary supraradials, which are much smaller : upon the upper of these rests the first arm-plate. This gives four arms to each ray, making at the arm-bases a formula of

$$\frac{\overline{4\quad \overset{4}{}\quad 4}}{4\qquad 4} = 20 \text{ arms.}$$

First interradial plate the largest in the whole body, ten or eleven-sided, resting between the plates of the adjacent radial series as high as the supraradial, and sometimes the secondary supraradial plates. The second interradial plate is small, pentangular, with parallel sides : the third interradial plates are two, resting on the second. In one of these spaces (which may perhaps indicate an anal area), the second supraradials do not rest upon the first interradial plate, and there are two elongate plates in the second range, with two or more small plates above in the third range.

Surface marked by numerous slender radiating striæ, which, in -

some specimens, form erect lamellæ by their greater elevation: also the plates of the radial series are marked by a strong central ridge which forms subangular or lanceolate nodes on the first and second radial plates, becoming obsolete on the third radial and first supradials; while the second supraradial plates are elevated into a broad angular ridge.

This species bears considerable resemblance to *C. sculptus*, in generai form and surface markings; but in structure and number of arms, it is very unlike.

Geological formation and locality. In the limestone of the Upper Helderberg group: Western New-York.

The Devonian genera of Crinoidea, Ceramocrinus and Epactocrinus of Muller, and Myrtillocrinus of Sandberger, possess some characters in common, which render it difficult, with the descriptions and illustrations within my reach, to determine the relations of these genera, or the range of characters which may be admitted under the several designations. Desirous of avoiding the multiplication of synonyms, I have placed the following species under the Genus Myrtillocrinus, until we are able to ascertain more fully its entire characters.

GENUS MYRTILLOCRINUS (Sandberger).

MYRTILLOCRINUS? AMERICANUS (n. s.).

Body small, broadly ovoid, largest at the upper end. Base truncated by the attachment of a proportionally large column, which has a quadrangular foramen. Basal plates five, very small, forming a low ring around the top of the column. Subradial plates five, alternating with the basals, hexagonal, but with the lower margins so nearly in a line that they appear pentagonal: height and width about equal, widening upwards. Radial plates large, hexagonal, a little higher than wide; the lateral margins subparallel. Area of the arm-cicatrix large, covering the greater portion of the plate; its surface vertical, and elevated above the margins of the plate, subelliptical in form, with a small central foramen, and the upper margin excavated by the passage leading from the arms to the cavity of the body.

Dome consisting (apparently) of but five plates, somewhat unequal, alternating with the radials; their surfaces elevated into strong nodes, which are each covered with unequal pustules.

Surface of calyx-plates depressed-convex.

There are some indications of a division across the middle of the radial plates, passing horizontally through the central perforation; and another from the perforation upward to the arm-openings, making the apparent single plate to be made up of three plates; but these characters are obscure. Should they, however, be proved to exist, it will be necessary to separate this form from the Genus MYRTILLOCRINUS as now defined.

Geological formation and locality. In limestones of the Upper Helderberg group: near Caledonia, Livingston county. C. A. WHITE, collector.

GENUS HAPLOCRINUS (STEININGER).

THE following species clearly appertains to the Genus HAPLOCRINUS, if we are to judge from the structure of the body. A single specimen preserves the base of one of the arms attached to the ray; setting at rest the question as to the position and relations of the arms, so far as this species is concerned. Unfortunately, this minute and pretty species occurs in a limestone where the material is much broken and comminuted; and although we have numerous specimens of the body, no other portions are preserved in connection, except in the specimen mentioned.

Dr. TROOST has recognized several species of HAPLOCRINUS in the rocks of Tennessee, one of which is a common form: there is some obscurity about its structure, though it probably appertains to this genus. The similarity in form and general character of the smaller species of STEPHANOCRINUS may have sometimes induced their reference to HAPLOCRINUS, from which they differ in the structure of the body and in the character of the arms or tentacula.

HAPLOCRINUS CLIO (n. s.).

BODY very small, subangularly turbinate below the arm-openings, pentangular when viewed from above, with protruding arm-bases. Column-facet proportionally large, deeply impressed, the margin rounded. Basal plates five, very low. Three of the radial series consist of two plates each, and two consist of but one plate each: these latter are large, heptagonal, and rest directly upon the basal plates. In the series of two, the first plate is small, quadrangular in two rays and pentangular in one, all wider than high: the second plate is intermediate in size between the first and the large radials, quadrangular in two rays and pentangular in one. The centres of the five large radial plates are strongly protruding at the upper margins for the articulation of the arms, and show a foramen with a central septum passing into the interior cavity of the body.

Dome apparently composed of five triangular plates, their broad bases resting on two adjacent radials. The sutures of two summit plates unite over the middle of the radial plates, and have the lower lateral angles truncated, forming the upper border of the arm-openings. The summit-plates have grooved sutures, shallow in the lower part and becoming deeper above, truncating the top of the pyramid : when viewed from above, these grooves form a five-pointed stellate depression.

Surface of plates marked by fine, wrinkled, radiating striæ. Sutures in the calyx slightly impressed below, and more strongly near the top of the radial plates, the margins of which are thickened and the upper edges rounded over into the summit.

The arms appear to have been composed of long slender plates, articulated by a mitred end to the sloping cicatrix of the radial plate. The inner face is strongly grooved, corresponding to the size of the opening into the cavity of the body.

Geological formation and locality. In limestone of the Marcellus shale: Onondaga county. C. A. White, collector.

GENUS NUCLEOCRINUS (Conrad).

Nucleocrinus : Conrad, in Journal Acad. Nat. Sciences, Philadelphia, Vol. viii, pa. 280, pl. 15, f. 17. 1843.

Olivanites : Troost, MS.; and in Catalogue of Crinoidea, Trans. Am. Association for the Advancement of Science, 1849, p.

Elæacrinus : F. Rœmer, 1852.

The description of this genus by Mr. Conrad in 1843, though very imperfect, is nevertheless accompanied by a figure, which sets at rest all question as to the fossil intended. The *Nucleocrinus elegans* (loc. cit. p. 280) is the one referred to as *N. halli* by Vanuxem (Report, p. 163), the latter name having been first applied to the species by Conrad.

I am not aware at what time the name *Olivanites* was first published by Troost, though I believe no description was ever given by him. In the Geological Report of Tennessee for 1841, the species (*O.*) *verneuili*, afterwards made the type of the Genus Olivanites, is placed under the Genus Pentremites. In 1849, the name *Olivanites* was published in Troost's Catalogue as cited. The species *Nucleocrinus* (*Olivanites*) *verneuili*, being a comparatively common form in the West, was widely known under the name *Olivanites*; while the original of *Nucleocrinus*, being extremly rare, was little known.

In 1852, Dr. F. Rœmer published his description of Elæacrinus

for the original of TROOST'S Genus OLIVANITES; recognizing the specific name *verneuili*, given by Dr. TROOST.

I conceive that there can be no doubt as to the propriety of restoring the earliest name; and I have therefore adopted Mr. CONRAD'S name of NUCLEOCRINUS.

Regarding only the general form of these bodies, this genus would include several species, heretofore described under PENTREMITES, from the Carboniferous limestones of the Western States, viz: *Pentremites norwoodi*, OWEN and SHUMARD; *P. melo*, OWEN & SHUMARD; *P. curtus*, SHUMARD, and others; while the *Pentremites* (*Olivanites*) *verneuili* = *Elœacrinus verneuili*, RŒMER, and *Olivanites angularis*, LYON, are of the age of the Upper Helderberg limestones; and the *Nucleocrinus elegans*, CONRAD, and at least one other species, occur in the Hamilton group. The *Pentremites rœmeri*, SHUMARD, is referred to the Chemung group.

Looking at other characters than those of general form, the specimens before me scarcely warrant the union of all these species under the Genus NUCLEOCRINUS or ELÆACRINUS. In *Nucleocrinus elegans*, and allied forms, we have three small basal plates and five short radials, which embrace the base of the pseudambulacral fields; while the interradial plates are extremely large, extending nearly the whole length of the pseudambulacral areas. The anal side is often, or usually, flattened, a little broader than the others, and is marked by a narrow lanceolate plate, which extends from the opening to the summit of the radial plates, resting upon them; thus, as it were, dividing the interradial plate, leaving a narrow portion on each side adjacent to the pseudambulacral fields. The central area at the summit, between the ovarian openings, is occupied by several small plates, which, in *N. elegans*, converge to the centre.

In the structure of the body, the typical forms of this genus differ from PENTREMITES in the short radial plates and extremely elongated interradials, which fill nearly all the space between the pseudambulacral areas; while the elongate anal plate is a marked feature. Now when we compare *Pentremites norwoodi* and *P. melo*, we have the same general form of body, with the extremely elongate, instead of the short, radial or forked plates which embrace the pseudambulacral fields; and a small interradial at the summit. The ovarian apertures, as well as perhaps the central opening, sometimes preserve minute plates, which close these orifices. The form alone can scarcely be of generic importance; for, although the base of NUCLEOCRINUS is usually concave, I have before me a species where the base is not

concave, and the three basal plates are quite prominent. The only conspicuous difference between *P. norwoodi* and *P. godoni* and others of the latter form, is in the depressed base and greater rotundity of the former species, giving to it its similarity to NUCLEOCRINUS. The *P. norwoodi* and *P. melo* have not the anal side conspicuously wider, more prominent, or flattened; which is the character observed in all true NUCLEOCRINI.

The different arrangement of parts, also, in the two genera, causes a different mode of increase in the plates, and a different surface-character.

There is likewise an intermediate form represented by the GRANATOCRINUS of TROOST (*Pentremites granulatus* [?] of RŒMER). This species is elliptical in form, with depressed base embracing in the bottom of the cavity the three small basal plates, while the radial plates reach halfway up the sides of the body. The anal side is not conspicuously different from the others, and the summit is unlike NUCLEOCRINUS; while it is more nearly like *Pentremites norwoodi*. This species is strongly granulose or tuberculose. The *Pentremites sayi* appears to me to belong to the same type : its base is not depressed, leaving the three basal plates protruding; while the radial plates reach about one-third the entire length, in this respect approaching NUCLEOCRINUS. In both these species the plate on the anal side occupies the entire space between the pseudambulacral fields, presenting scarcely any important difference from the other interambulacral or interradial spaces.

I would therefore suggest the separation of the species under the name originally given by Dr. TROOST, viz. GRANATOCRINUS.

The Genus NUCLEOCRINUS of CONRAD may be characterized as follows :

GENUS NUCLEOCRINUS (CONRAD, as emended).

GENERAL form of body elliptical or ovoid, supported on a slender column. Basal plates three, minute. Radials five, small and not deeply forked, receiving the bases of the narrow elongate pseudambulacral fields. Interradial plates six, four of them elongate, broadly lanceolate, truncate or concave on the lower side, and occupying the space between the pseudambulacral areas : a narrow intercalated plate on the anal side reaches from the aperture to the radial plate, dividing the interradial on that side into two narrow curving plates. Oral aperture central; the summit occupied by five or more plates. Ovarian apertures in five pairs at the extremities of the pseudambulacral fields. Anal aperture lateral;

its course and margin marked by the prominence or greater width of one of the interambulacral spaces on that side, owing to the intercalation of the anal plate.

Surface striato-cancellate or striato-granulose.

The structure given above differs in some essential features from that usually recognized in these fossils. The narrow lanceolate space in the centre of the interradial plates, which is always differently marked from the portion on either side, and usually more elevated (though in one species it is depressed), has been regarded as a distinct plate; but after an examination of all the specimens accessible to me, I am unable to find evidence of a suture-line bounding it; while on the anal side, the narrow plate, which is nearly of the same form, is limited by a distinct suture-line. I have therefore been compelled to give this signification to the different parts.

NUCLEOCRINUS ELEGANS.

Nucleocrinus elegans : Conrad, Journal Acad. Nat. Sciences, Philadelphia, Vol. viii, p. 280. 1842.

Nucleocrinus halli, cited by Vanuxem, Geological Report of the Third District of New-York, p. 163.

General form subangularly ovoid or subelliptical, smaller at the base, which is somewhat deeply concave at the point of attachment of the column. The pseudambulacral fields are swollen out on the sides and terminate in prominent angles below, giving the base a pentangular form. The intervening or interradial spaces are scarcely or but slightly concave above, but become distinctly so below the middle and at the base. From the angles at the base of the pseudambulacral areas, five well-defined ridges extend to the margin of the column-cavity. Summit flattened.

Basal plates small, extending only to the margin of the column-cavity. Radial plates short, forming but a small part of the height of the body, very slightly notched, and receiving only the base of the pseudambulacral fields; their upper ends directed obliquely, and fitting into the concave lower ends of the interradial plates. On the anal side, the upper extremities on one side of two adjacent radials are shorter than the others, owing to the extension of the anal plate : interradial plate broad-lanceolate, except on the anal side, where it is divided, leaving two narrow plates. Anal plate sublanceolate, the base occupying the entire width between the pseudambulacral fields. Poral pieces on each side the pseudambulacral fields, from thirty-five to forty-three (in specimens of different sizes). Centre of the summit occupied by five or more small plates.

Surface of radial plates striate. A lanceolate space embracing the full width of the interradial plates at the base, and terminating in a narrow point above, is striato-granulose with transverse undulating striæ; while the area between this and the pseudambulacral field is marked by strong, longitudinal, abruptly undulating striæ.

The largest specimens of this species which have been observed, are scarcely half an inch in height. In an older specimen, the greatest width is equal to the height; while in a younger one, it is less. The larger of these specimens before me is the one from which the original figure and description of Mr. Conrad was made.

Geological formation and locality. In the shales of the Hamilton group: at Moscow, Livingston county.

NUCLEOCRINUS LUCINA (n. s.).

Body elliptical, the greatest width above the middle, deeply pentalobate near the base and less deeply above: base almost flat. Basal plates nearly on a plane with the radials at the base of the pseudambulacral fields, and bearing an elongate node in the centre. Radial plates short, embracing only the base of the pseudambulacral fields. Interradial plates elongate, broad lanceolate, reaching the summit. Anal plate prominent above, not reaching the summit, leaving narrow portions of the interradial plate on each side. Centre of the summit a little flattened: the oral plates not determined.

Surface striato-granulose.

This species is more deeply lobed, and comparatively broader at base, than the *N.* (*Olivanites*) *angularus* of Lyon; and is in all respects a very distinct species. Length from one-half to one inch.

Geological formation and locality. In the shales of the Hamilton group: Livingston county and elsewhere. C. A. White, collector.

NUCLEOCRINUS LUCINA, *var.*

A large specimen, possessing the same general characters as the preceding, is more expanded in the upper part of the body, with the base proportionally narrower. This may possibly be only a variety of form, which a larger number of specimens might show to be a phase common to older individuals.

NUCLEOCRINUS VERNEUILI.

Pentremites verneuili : Troost.
Olivanites verneuili : Troost.
Elæacrinus verneuili : Rœmer.

This species, which is common in Kentucky and in the limestone at the Falls of the Ohio, and likewise in the State of Ohio, appears under considerable variety of form. It has been illustrated by Dr. F. Rœmer in his Monograph of the Blastoidea, and by Mr. S. S. Lyon in the Geological Report of Kentucky.

A single specimen, bearing the general features of this species, though only one-quarter of an inch in length, has been found by Mr. White at Stafford in Genesee county. The base of the specimen is not concave, but protruding; which I attribute to its young state. Farther collections may prove it to be a distinct species; in which case, I propose the name *Nucleocrinus conradi.*

The *Nucleocrinus angularis* of Lyon has the sides flattened above and concave below; the ambulacral fields forming prominent angles which are approximate below, leaving a narrow base.

GENUS PENTREMITES (Say).

PENTREMITES LEDA (n. s.).

Body ovate, the greatest width below the centre, triangular at the junction with the column : distance from the column to the base of the pseudambulacral fields less than one-fourth the entire height. Basal plates small, one quadrangular and two pentangular. Radial plates elongate, narrow, deeply forked; the greatest width of the extremities equal to one-fourth the length of the plate. Interradial plates small, quadrangular or lozenge-shaped, longer above than below the point of greatest diameter. Pseudambulacral fields long, narrow, slightly widening upward and grooved along the centre, composed of a double series of ornamented poral plates; the plates about eighteen to one-fourth of an inch. Summit openings small.

Surface marked by very fine, equal, threadlike striæ, parallel to the margins of the plates.

Geological formation and locality. In the shales of the Hamilton group: Western New-York. C. A. White, collector.

PENTREMITES CALYCE (n. s.).

A specimen having many of the characters of the above species, presents a much greater width of body in proportion to the height. The pseudambulacral fields are also broader, and do not widen towards the top; and the poral plates are a little larger. The striæ of the surface are more distinct, and the interradial plates are marked on the upper end by several very small nodes; a character which has not been observed in the *P. leda*.

Geological formation and locality. In the shales of the Hamilton group: Western New-York.

PENTREMITES MAIA (n. s.).

Body elongato-ovate; greatest width just above the base of the pseudambulacral areas. Base small, sharply triangular near the junction of the very small column. Basal plates short, forming about one-third of the height below the pseudambulacral fields. Radial plates narrow, elongate, forked about four-fifths of their length. Interradial plates minute, quadrangular or lozenge-shaped. Pseudambulacral fields narrow, widening towards the summit, convex, slightly elevated above the margins of the radial plates, composed of a double series of highly ornamented poral plates; the plates about twelve in one-fourth of an inch. Summit openings very small.

Surface marked by fine threadlike striæ parallel to the margins of the plates.

This species differs from *P. leda* in the character of the base, which is smaller, more elongate and attenuate, and more distinctly triangular: also in the pseudambulacral fields, which are composed of longer plates, giving only two-thirds as many in an equal distance.

Geological formation and locality. In shales of the Hamilton group: Moscow, N.Y. 1837.

PENTREMITES WHITEI (n. s.).

Body small, somewhat broadly turbinate below the base of the pseudambulacral fields, constricted just above, and rounded at the summit; pentalobate in a basal view. The pseudambulacral fields extend a little more than half the length of the body. Base small, slightly pentangular: basal plates reaching about halfway to the base of the pseudambulacral fields. Radial plates deeply furcate, with the pseudambulacral areas extending about two-thirds their length. Interradial plates comparatively large, lozenge shaped.

The pinnules or arms are preserved on the specimen to about twice

the length of the body, and are still imperfect at the extremities: they are composed of joints, which are longer than wide, longitudinally striate and somewhat nodose-carinate on the back; with the inner margins apparently giving origin to minute tentacula.

SURFACE of body-plates finely striate. Length of body a little more than half an inch.

The specimens which have been examined are crushed, and the true form cannot be fully known; but it appears to have resembled in shape the *P. puzo*.

Geological formation and locality. Shales of the Hamilton group: Western New-York. C. A. WHITE and R. P. WHITFIELD, collectors.

PENTREMITES LYCORIAS (n. s.).

BODY subfusiform, attenuate below, tapering gradually to the column: base triangular; summit obtuse. The basal plates occupy about one-third the entire length of the body; their upper faces nearly transverse, or scarcely indented by the radial plates. The radial plates long and narrow, divided for about one-half their length, strongly protruding at the base of the pseudambulacral fields, giving a decided pentangular form, attenuate above: interradial plates minute. Pseudambulacral fields rapidly expanding from the base upwards, and covered by the pinnules so that the number of poral plates cannot be determined. Pinnules extending above the summit to a height equal to the length of the body, which is about three-fourths of an inch. The greatest breadth of the body, at the base of the pseudambulacral fields, is a little more than three-tenths of an inch.

SURFACE marked by extremely fine threadlike striæ, which are parallel to the suture-lines. Column round, long, slender, and composed of very short joints.

This species is more attenuate at base than *P. pailleti*, and the pseudambulacral fields are proportionally longer.

Geological formation and locality. In the shales of the Hamilton group, in several counties in Western New-York.

GENUS ELEUTHEROCRINUS (SHUMARD)*.

ELEUTHEROCRINUS WHITFIELDI (n. s.).

BODY small subelliptical, triangular and pointed at base, and truncate at summit: length a little more than twice the greatest width. Dorsal side (or side of ambulacral fields) irregularly convex, becoming angular in the upper part. Ventral basal plate very

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* In Proceedings of Acad. Nat. Sciences, Philadelphia, 1856.

small, subquadrangular or lozenge-shaped; the others elongato-lingulate, reaching half the height of the body; the margins subparallel.

THE two regular radial plates are long, slender, deeply furcate, receiving the ambulacral areas. The lateral radial plates irregular, having their ventral extremities similar to those of the regular radials, and the dorsal extremities elongate triangular, and curved to unite with the elongate basal and short dorso-radial plates. Dorsal or short radial plate shield-shaped or irregularly subovate, truncate and strongly angular at the top for the reception of the summit-pseudambulacral field. Interradial plates minute. Four of the pseudambulacral fields long and slender, extending about four-fifths of the entire length of the body, as wide as the limbs of the regular radial plates, composed of a double series of short obliquely arranged and beautifully ornamented poral plates, which number about sixteen to one-fourth of an inch. The fifth pseudambulacral field small, triangular, horizontal at the summit of the body, composed of eight or ten curved plates on each side. Each plate of the pseudambulacral field supports a long slender arm or tentacle, composed of a double series of short plates interlocking on the back. In the lower part, the breadth from the back to the inner face is about three times the transverse diameter, gradually decreasing in the extension upwards, and becoming about equal to the transverse diameter: here they appear to be grooved on the face, and marked with small scars as if for the attachment of cilia. The arms have been preserved, in some instances, to a length equal to two-thirds the length of the body, and are yet imperfect at their distal ends.

This species is the second of the genus that has been discovered. The *E. cassedayi* of SHUMARD occurs in limestones of the age of the Upper Helderberg rocks near Louisville, Kentucky; and the present species, in the shales of the Hamilton group in Western New York. This differs from the western species in having the long basal plate much narrower, the short radial plate distinctly angular in the middle, and the pseudambulacral areas wider, while the entire width is proportionally less than in that species. C. A. WHITE, collector.

GENUS CODASTER = CODONASTER (M'COY).

CODASTER PYRAMIDATUS.

The *Codaster pyramidatus* of SHUMARD, or a closely allied species, occurs in the Upper Helderberg limestone, near Caledonia in Livingston county, N.Y.

July, 1862.

The greater proportion of the species of Crinoidea described in the preceding pages are of the collections of Mr. C. A. White, made during the summer and autumn of 1860 : some are from the collections of 1859, by Mr. C. A. White and Mr. R. P. Whitfield, made for the Palæontology of New-York. The *Cacabocrinus speciosus*, and some specimens of Ancyrocrinus, are from the State Collection; and a few others, not particularly indicated, have been in my own cabinet many years.

Heretofore the species of Crinoidea known in the Upper Helderberg and Hamilton groups have been so few, that they afforded but unsatisfactory evidence of the character of this fauna during those geological periods.

Several other species still remain undescribed; and from the experience of the past three years, I have no doubt but the Hamilton group will ultimately yield a much larger number than we yet know.

The genera now known amount to seventeen, including two or three which may be considered subgenera.

The accompanying diagrams of *Nucleocrinus elegans* illustrate the structure of that species, as well as of the genus.

Fig. 1.

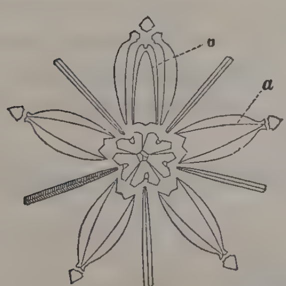


Fig. 2.

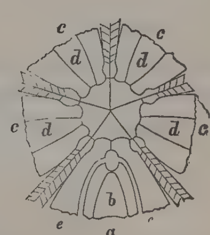


Fig. 1. Nat. size. The central part consists of the three small basal plates, and the five short radial plates. *a*, The interradial plate, with the small summit plate near the apex. *b*, The anal plate, margined by the two narrow curving interradial plates of the anal side. The linear pieces represent the pseudambulacral fields.

Fig. 2. Summit enlarged, showing the form and relative position of the summit plates. *a*, Anal plate; *b*, indicates the smooth space, which occupies the middle of the plate. *c*, The interradial plates, *d*, their smooth spaces. *e*, The irregular, curving interradial plates of the anal area.

OBSERVATIONS UPON A NEW GENUS OF BRACHIOPODA.

In the Thirteenth Report of the Regents on the State Cabinet of Natural History, page 69, I called attention to the characters of *Atrypa? modesta*, and the internal spires of that fossil. I have lately received, through the kindness of Dr. Charles Rominger of Ann-Arbor, Michigan, some very interesting specimens of this species, in which the direction and relations of the internal spires appear to be fully shown. The crura spread from the rostral cavity almost rectangularly towards the lateral margins, curving with the shell to near its base; and thence recurving, they make about three volutions, with the apices of the spires directed obliquely into the cavity of the dorsal valve. The outer limbs of the two spires are connected by a band, or loop, stretching across the entire space with a gentle curve towards the beak, and exterior to the spires on the dorsal side.

The direction of the spires is nearly the same as in Atrypa, differing in the presence of the strong loop; while the shell, in its exterior character, is quite unlike Atrypa. In two specimens examined, there is a slight variation in the direction and extent of the loop. In one, it rises from below the middle of the outer curve of the spiral, and, curving gently, passes over the apices of the spires. In the other, the origin of the loop appears to be at a higher point, or otherwise it lies parallel with the outer curve of the spiral for some distance, and stretches from one side to the other between the spires and the base of the crura. This difference may be accidental, or may be caused by displacement of the loop in one case : in both, however, the essential features are preserved.

For the Brachiopoda of this character, I propose the name Zygospira*.

GENUS ZYGOSPIRA (n. g.).

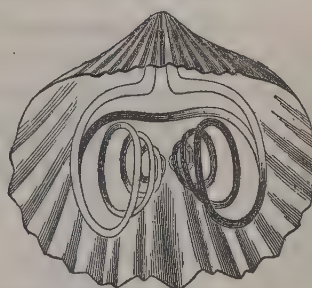
Shells bivalve, equilateral, inequivalve : surfaces plicate in the typical species; a sinus on the dorsal valve. Internal spires arranged somewhat as in Atrypa, with a broad loop passing from the outer limbs of the spiral band antirely across from side to side, near to or above the centre, and close to the inner side of the dorsal valve.

* Gr. ζυγος, *jugum;* σπειρα, *spira.*

The *Atrypa modesta* (loc. cit.) is the typical species of this genus, the interior of which is shown in the accompanying illustrations. Both figures are much enlarged : fig. 1 represents the dorsal valve removed, and shows the loop as actually seen in the specimen, extending across the centres of the spires. Fig. 2 represents another specimen with the ventral valve removed, and the spires lying in the dorsal valve ; the loop being shown in the position actually seen in this specimen*.

FIG. 1.

FIG. 2.



* By grinding or polishing the surfaces, and macerating in acid, the internal spires are frequently shown in a satisfactory manner.

EXPLANATIONS OF PLATES.

PLATE 1.

Fig. 1. PLATYCRINUS ERIENSIS, enlarged two diameters : page 119.

Fig. 2 – 4. MYRTILLOCRINUS AMERICANUS, enlarged two diameters.
2 and 3, lateral views; 4, basal view. Page 142.

Fig. 5 – 9. HAPLOCRINUS CLIO, enlarged six diameters : p. 143.
5 and 6, lateral views, showing one ray of two plates and another of one plate; 7, base of same; 8, view of summit of same; 9, lateral view of another specimen, showing the first plate of the arm on one ray.

Fig. 10. PENTREMITES MAIA : p. 150.

Fig. 11. PENTREMITES LEDA : p. 149.

Fig. 12 & 13. CODASTER PYRAMIDATUS : p. 152.
Lateral and summit views.

Fig. 14 & 15. NUCLEOCRINUS ELEGANS : p. 147.
14, lateral view; 15, enlargement of one interambulacral space, with the adjacent poral plates.

Fig. 16. NUCLEOCRINUS LUCINA : p. 148.

Fig. 17. CHEIROCRINUS CLARUS : p. 116.
View of an entire individual, natural size : the root is attached to a fragment of a column of another crinoid.

Fig. 18. Roots, apparently of CHEIROCRINUS, attached to other crinoid columns.

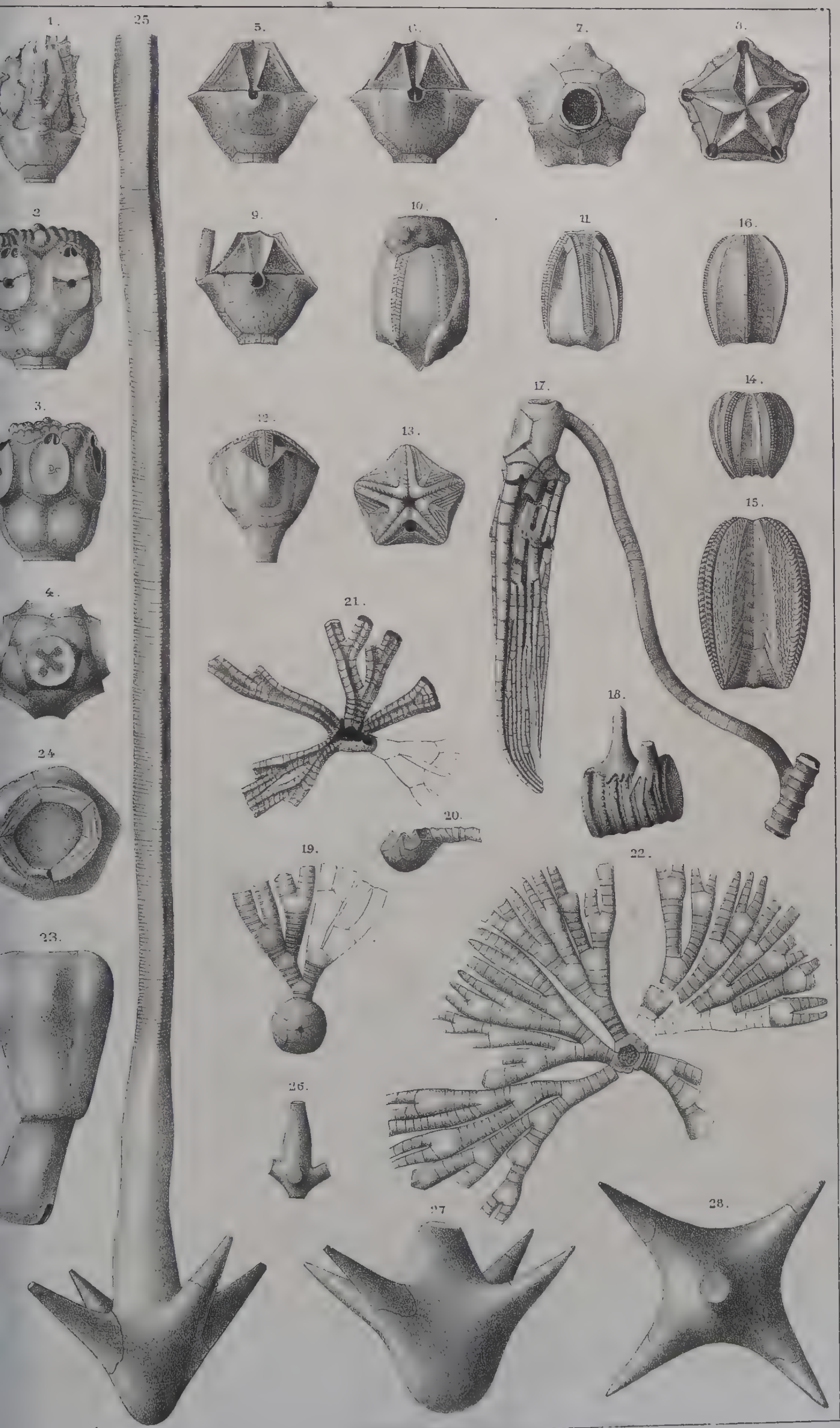
Fig. 19 – 22. CYATHOCRINUS BULBOSUS : p. 123.
19, basal view, with part of one arm shown; 20, lateral view showing height of body, a small part of one arm remaining attached; 21, upper side of a small individual, showing the central cavity and the spreading and broadly grooved arms; 22, exterior view of the spreading arms of a larger individual, from which the body has been broken off.

Fig. 23 & 24. EDRIOCRINUS PYRIFORMIS : p. 116.
23, lateral view; 24, view of the summit of the specimen.

Fig. 25 & 26. ANCYROCRINUS BULBOSUS : p. 118.
25, a large specimen preserving about seven inches of the column attached; 26, a young individual.

Fig. 27 & 28. ANCYROCRINUS SPINOSUS : p. 119.
27, lateral view; 28, view of summit.

PLATE I.



Swinton, lith.

PLATE 2.

Fig. 1. ORTHIS EMACERATA. Dorsal valve.

Fig. 2. " " Interior of the ventral valve.
Thirteenth Annual Report on the State Cabinet, page 121.

Fig. 3. " " Interior of a ventral valve of the form ordinarily referred to *O. testudinaria.*
From the same geological position.

Fig. 4. ORTHIS CLYTIE. Dorsal view.

Fig. 5. " " Interior of ventral valve.
Fourteenth Annual Report on the State Cabinet, p. 90.

Fig. 6 – 8. ORTHIS[?] ELLA.
Thirteenth Ann. Report id. p. 121. = *Trematospira? ella.*

The specimens figured show the extremes of variation in number of plications, etc. The species is not an ORTHIS, but possesses characters belonging to TREMATOSPIRA, but with a more distinct area than has been observed in any species of that genus; while there is no sinus upon the ventral valve.

Fig. 9 – 11. TREMATOSPIRA HIRSUTA.
Fourteenth Annual Report on the State Cabinet, p. 101.
= *Atrypa hirsuta.* Tenth Ann. Report id. p. 128.

Fig. 12 – 14. " " Dorsal, front, and profile views of a large individual, in which the mesial fold and sinus are strongly developed.

Fig. 15 & 16. " " Interior of the ventral & dorsal valves.

Fig. 17 – 25. MERISTELLA? UNISULCATA=*Atrypa unisulcata:* CONRAD, Annual Report of 1841.
See Fourteenth Annual Report on the State Cabinet, p. 101.

Fig. 17 is a cardinal view of a well-preserved form from the Upper Helderberg limestone; in which there is a ridge-like fold on the dorsal valve, parallel with and close to the hinge-line or cardinal margin of the valve. In fig. 18, a specimen from the Hamilton group, this fold is more oblique, rising from near the beak, as shown in the figure, while there is a second fold on the side of the shell. Fig. 19 is a specimen from the Upper Helderberg limestone of the West; in which the fold is sharp and clearly defined, slightly oblique, and intermediate to the former two: the specimen is more gibbous than those from the limestone of New-York*. Figs. 20 & 21 are ventral and dorsal views of a large specimen from the limestone of New-York; Fig. 22, profile of the same; Fig. 23, front view of the same. Fig. 24, interior of the dorsal valve, showing a median septum, cardinal process, teeth, sockets, and bases of the crura. Fig. 25, interior of ventral valve, showing the teeth and muscular impression.

These figures (24 & 25) are from specimens, before referred to, as furnished through the kindness of Mr. S. S. LYON, from the limestone of the Falls of the Ohio.

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* For the present, and until farther investigation, I would propose to designate the Hamilton form as *M. unisulcata,* var. *biplicata;* and the western form as *M. unisulcata,* var. *uniplicata.*

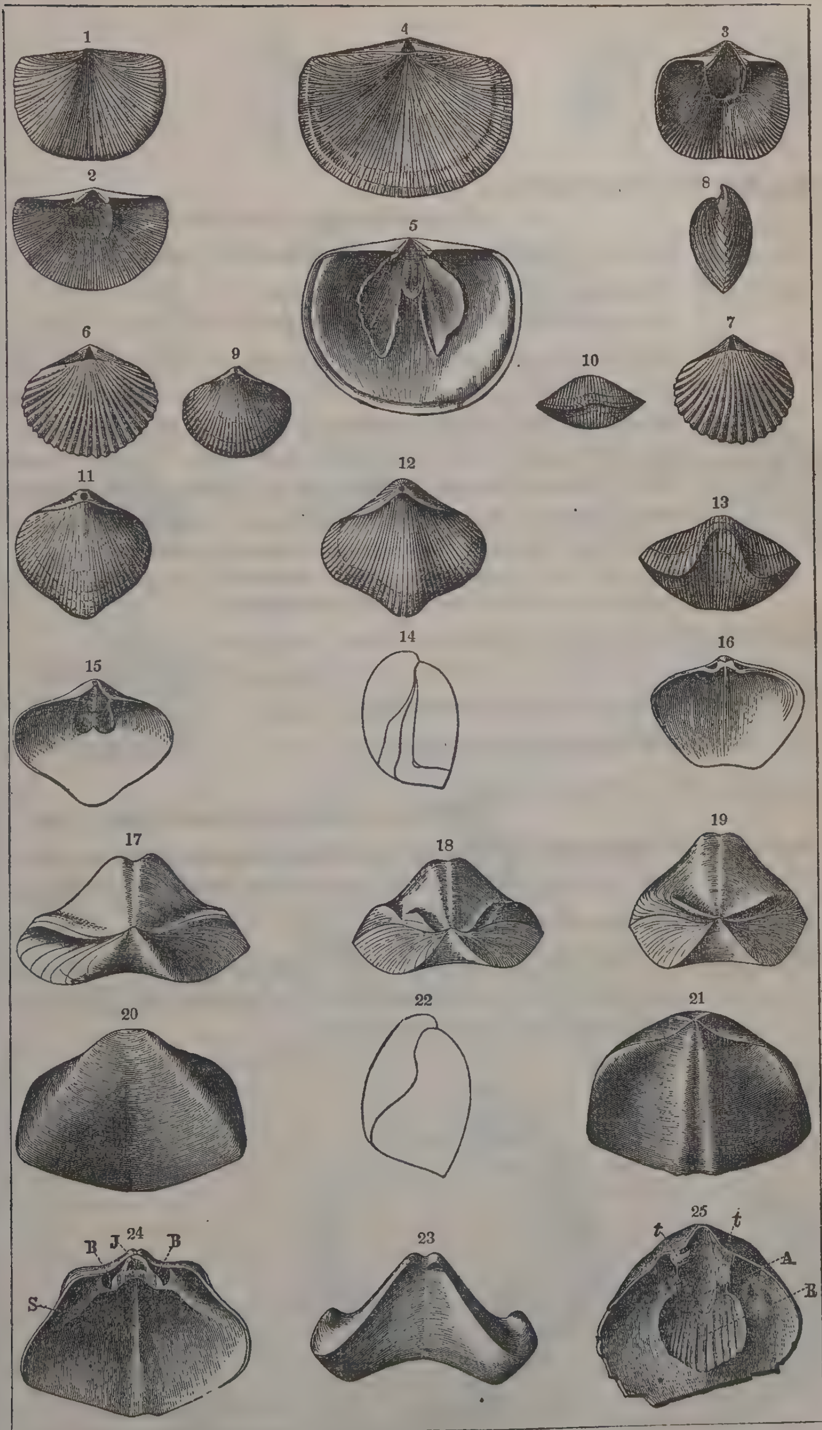
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PLATE 3.

Fig. 1, 2 & 3. CENTRONELLA IMPRESSA.
Fourteenth Report on the State Cabinet, p. 102.

Fig. 4 & 5. Interior of dorsal and ventral valves of the same.

Fig. 8 & 9. CRYPTONELLA. Generic illustrations.
See pages 101 & 102 of the Fourteenth Report on the State Cabinet.

Fig. 6 & 7. CRYPTONELLA EXIMIA. An undescribed species from the Lower Helderberg limestone. The form is ovate, narrowing towards the beak, which is sometimes elongate, slightly curving but not incurved, perforate at the extremity, with the space below, between the perforation and the beak of the opposite valve, occupied by two deltidial pieces. Surface marked by concentric striæ and some stronger lines of growth.

This species usually occurs in fragments or crushed : no specimens have, until now, been found sufficiently entire for illustration.

Fig. 10 & 11. ATHYRIS ANGELICA. Dorsal and ventral valves.
Fourteenth Report on the State Cabinet, p. 99.

Fig. 12 & 13. Front and profile views of the same.

Fig. 24. Cast of ventral valve of the same.

Fig. 15 & 16. ATHYRIS CORA.
Thirteenth Report on the State Cabinet, p. 94.

Fig. 17 – 19. MERISTELLA NASUTA = *Atrypa nasuta*, CONRAD. Figures showing gradations in size, and in the front extension.

Fig. 20. Profile view of specimen fig. 19.

Fig. 21 & 22. Dorsal and profile views of a large specimen, probably of this species. The prolongation in front is wider and more extended than in the ordinary forms.

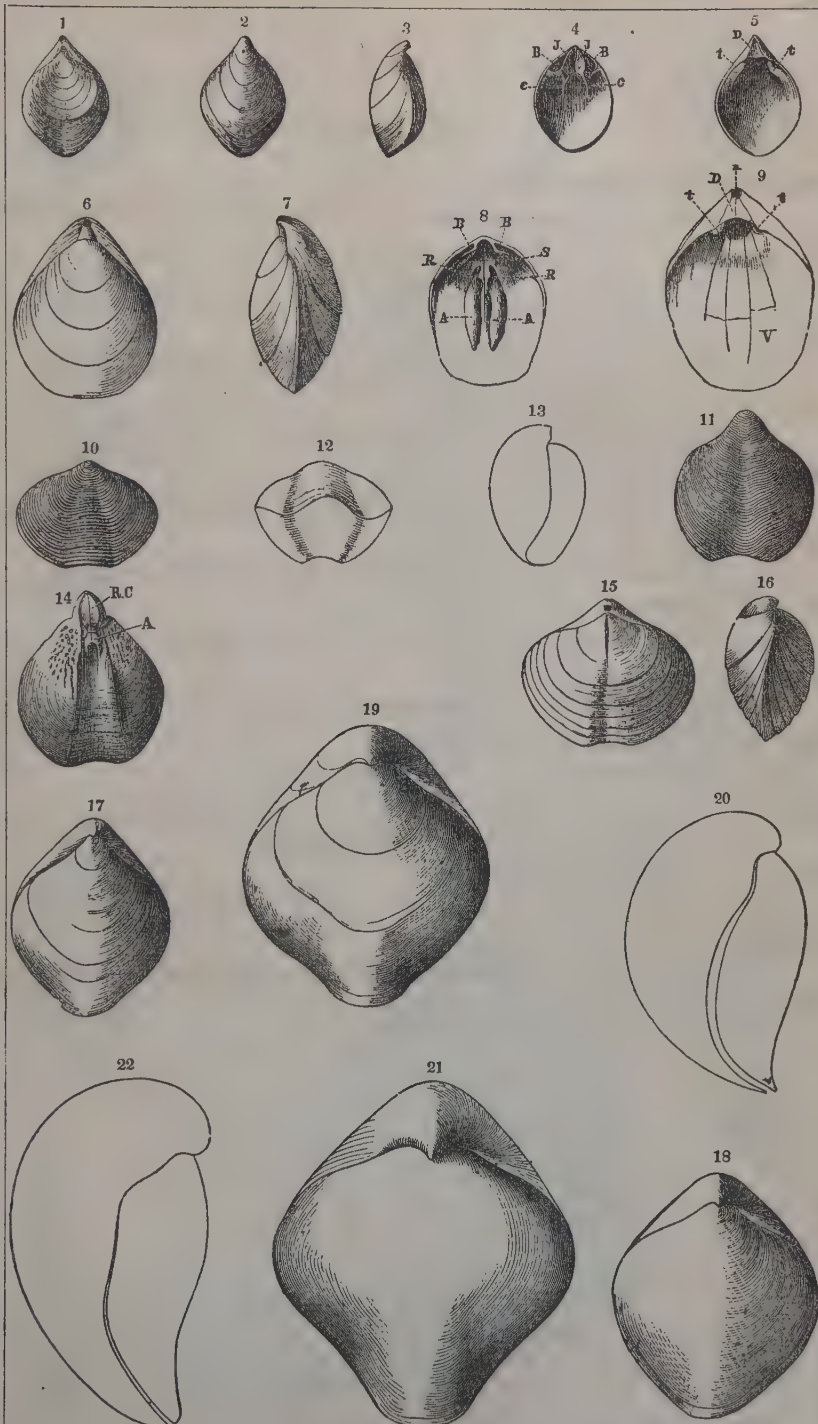
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PLATE 4.

Fig. 1. MACROCHEILUS HEBE.
Fifteenth Report of the Regents on the State Cabinet, p. 49; Appendix C continued, p. 20.

Fig. 2. MACROCHEILUS HAMILTONIÆ.
Fifteenth Report on the State Cabinet, p. 49; Appendix C cont. p. 21.

Fig. 3. MACROCHEILUS (HOLOPEA) MACROSTOMUS.
Fifteenth Report on the State Cabinet, p. 49; Appendix C cont. p. 21.

Fig. 4 & 5. LOXONEMA BELLATULA.
Fourteenth Report on the State Cabinet, p. 104.

Fig. 6. LOXONEMA SOLIDA.
Fifteenth Report on the State Cabinet, p. 51; Appendix C cont. p. 23.

Fig. 7. LOXONEMA ROBUSTA.
Fifteenth Report on the State Cabinet, p. 52; Appendix C cont. p. 24.

Fig. 8. LOXONEMA HAMILTONIÆ.
Fifteenth Report on the State Cabinet, p. 53; Appendix C cont. p. 25.

Fig. 9. LOXONEMA DELPHICOLA.
Fifteenth Report on the State Cabinet, p. 52; Appendix C cont. p. 24.

Fig. 10. MURCHISONIA LEDA.
Fourteenth Report on the State Cabinet, p. 103.

Fig. 11. MURCHISONIA MAIA.
Fourteenth Report on the State Cabinet, p. 103.

Fig. 12. MURCHISONIA DESIDERATA.
Fifteenth Report on the State Cabinet, p. 50; Appendix C cont. p. 22.

Fig. 13. MURCHISONIA TURRICULA.
Fifteenth Report on the State Cabinet, p. 50; Appendix C cont. p. 22.

Fig. 14. PLEUROTOMARIA KEARNEYI.
Fourteenth Report on the State Cabinet, p. 105.

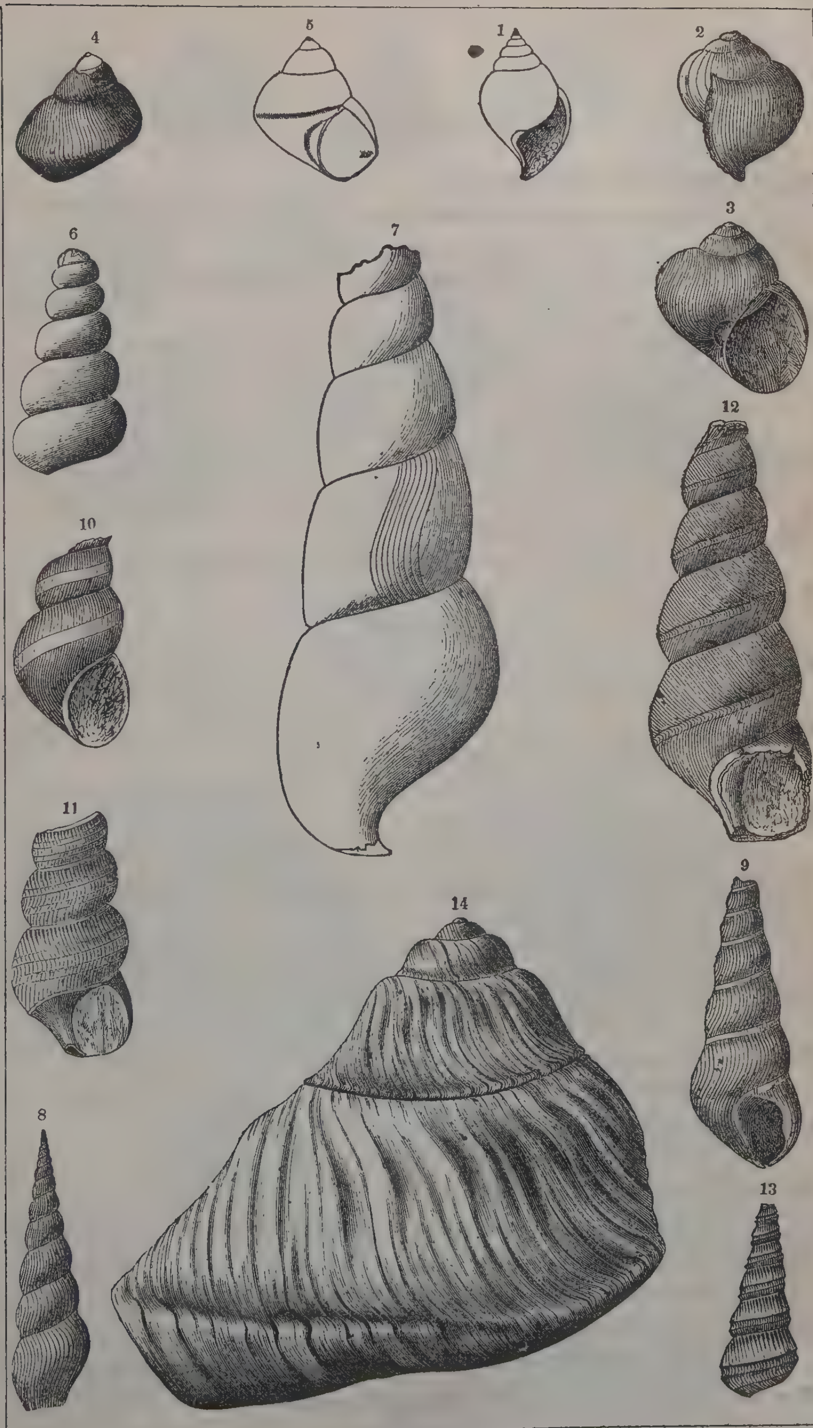
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PLATE 5.

Fig. 1. PLEUROTOMARIA TRILIX.
Fifteenth Report on the State Cabinet, p. 45; Appendix C cont. p. 17.

Fig. 2. PLEUROTOMARIA CAPILLARIA.
Fifteenth Report on the State Cabinet, p. 45; Appendix C cont. p. 17.

Fig. 3. PLEUROTOMARIA LINEATA.
Fifteenth Report on the State Cabinet, p. 44; Appendix C cont. p. 16.

Fig. 4. PLEUROTOMARIA RUGULATA, preserving the shell.
Thirteenth Report on the State Cabinet, p. 108.

Fig. 5. PLEUROTOMARIA RUGULATA : cast of the interior.
Thirteenth Report on the State Cabinet, p. 108.

Fig. 6. PLEUROTOMARIA DORIS.
Fifteenth Report on the State Cabinet, p. 43; Appendix C cont. p. 15.

Fig. 7 & 8. PLEUROTOMARIA HEBE.
Fourteenth Report on the State Cabinet, p. 105.

Fig. 9 & 10. PLEUROTOMARIA SULCOMARGINATA : CONRAD, 1842.
Fifteenth Report on the State Cabinet, p. 46; Appendix C cont. p. 18.

Fig. 11. PLEUROTOMARIA ROTALIA. An enlarged figure : the figure represents the species as too rotund.
Fifteenth Report on the State Cabinet, p. 46; Appendix C cont. p. 18.

Fig. 12. PLEUROTOMARIA LUCINA.
Fifteenth Report on the State Cabinet, p. 42; Appendix C cont. p. 14.

Fig. 13. PLEUROTOMARIA ARATA. A large individual, which is somewhat distorted.
Fifteenth Report on the State Cabinet, p. 43; Appendix C cont. p. 14.

Fig. 14. PLEUROTOMARIA ARATA. A smaller individual, preserving the natural proportions.

Fig. 15. CYCLONEMA HAMILTONIÆ.
Fifteenth Report on the State Cabinet, p. 47; Appendix C cont. p. 19.

Fig. 16. CYCLONEMA LIRATA.
Fifteenth Report on the State Cabinet, p. 47; Appendix C cont. p. 19.

Fig. 17. CYCLONEMA MULTILIRA.
Fifteenth Report on the State Cabinet, p. 48; Appendix C cont. p. 20.

Fig. 18. PLATYOSTOMA TURBINATA.
Fourteenth Report on the State Cabinet, p. 106.

Fig. 19. PLATYOSTOMA LINEATA : CONRAD.
Fifteenth Report on the State Cabinet, p. 40; Appendix C cont. p. 12.

Fig. 20. " " View of the spire.

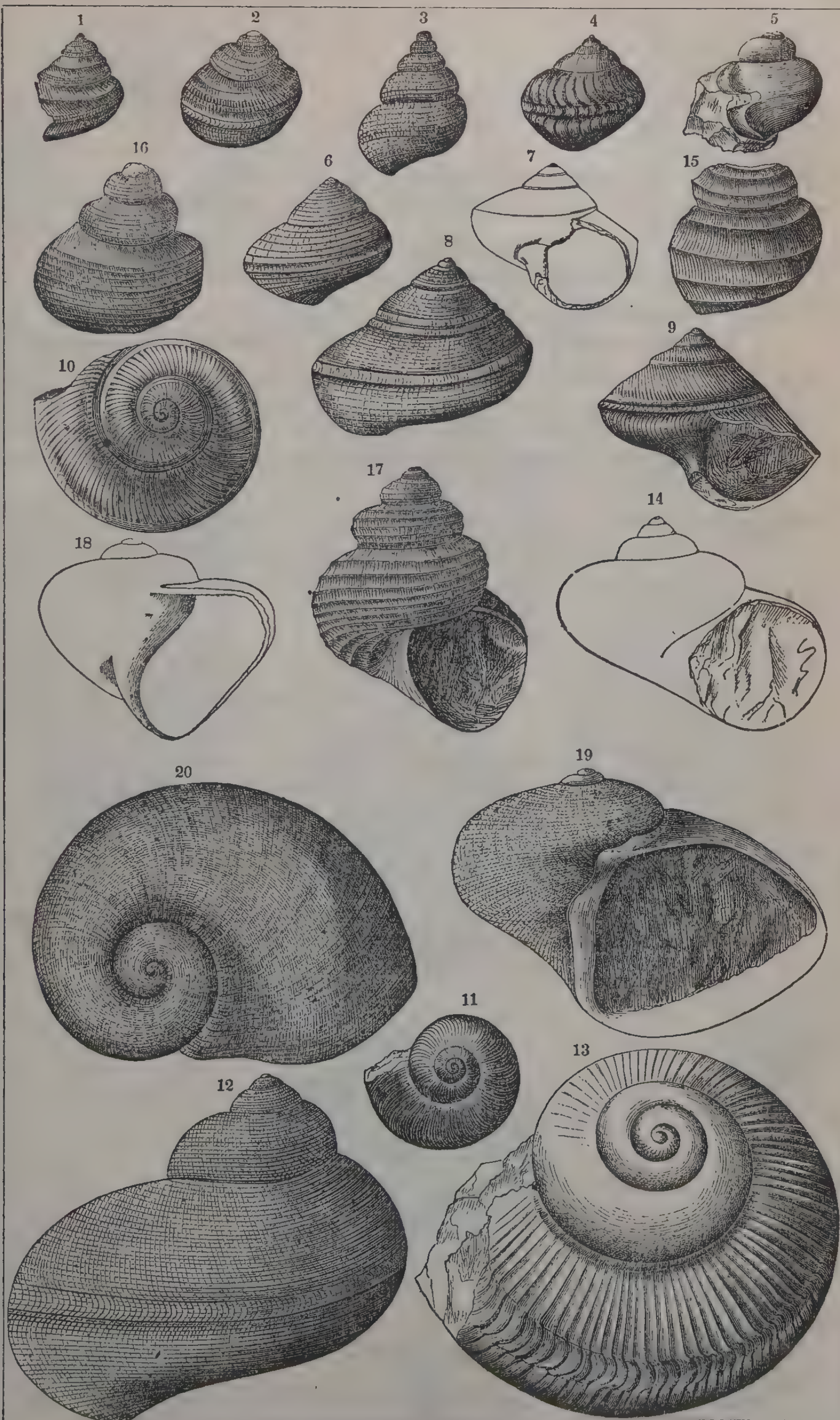
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PLATE 6.

Fig. 1 & 2. EUOMPHALUS [STRAPAROLLUS] LAXUS.
Fifteenth Report on the State Cabinet, p. 54; Appendix C cont. p. 26.

Fig. 3. EUOMPHALUS [STRAPAROLLUS] CLYMENIOIDES.
Fifteenth Report on the State Cabinet, p. 54; Appendix C cont. p. 26.

Fig. 4. PLEUROTOMARIA EUOMPHALOIDES.
Fifteenth Report on the State Cabinet, p. 46; Appendix C cont. p. 18.

Fig. 5 & 6. PORCELIA? NAIS = GYROCERAS NAIS.
Fifteenth Report on the State Cabinet, p. 68; Appendix C cont. p. 40.
A farther examination of this species does not disclose septa, which I had supposed to exist when referring it to the Genus GYROCERAS. It is probably a PORCELIA.

Fig. 7, 8 & 9. BELLEROPHON CURVILINEATUS : CONRAD.
Fifteenth Report on the State Cabinet, p. 55; Appendix C cont. p. 27.
Fig. 7, view of aperture; Fig. 8, lateral view showing the umbilicus; Fig. 9, lateral view of a cast.

Fig. 10 & 11. CYRTOLITES PILEOLUS.
Fifteenth Report on the State Cabinet, p. 61; Appendix C cont. p. 33.
This species may prove to belong to the Genus CARINAROPSIS or PHRAGMOSTOMA.

Fig. 12, 13 & 14. PHRAGMOSTOMA NATATOR.
Fifteenth Report on the State Cabinet, p. 60; Appendix C cont. p. 32.
Fig. 12, view of aperture; 13, dorsal view; 14, longitudinal section.

Fig. 15, 16 & 17. PTEROTHECA SAFFORDI = CLIODERMA SAFFORDI.
Fourteenth Report on the State Cabinet, p. 96.
Fig. 15, interior view, showing the broad septum; 16, transverse section. showing the form and extent of the internal cavity; 17, longitudinal section, with the outline of the margin of the same specimen.

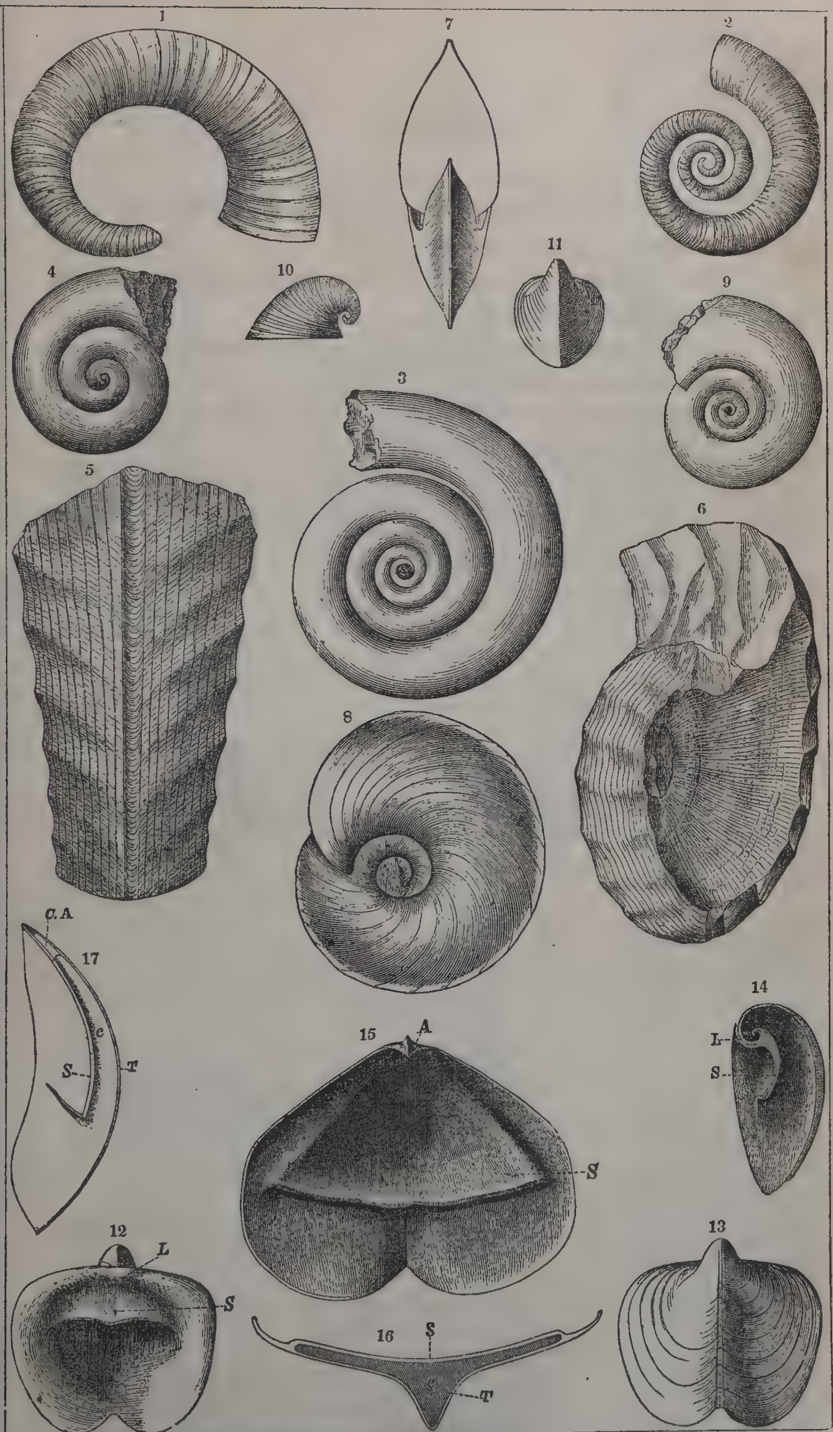
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PLATE 7.

Fig. 1. Gomphoceras beta.
Fifteenth Report on the State Cabinet, p. 72; Appendix C cont. p. 44.

Fig. 2 & 3. Orthoceras multicinctum.
Fifteenth Report on the State Cabinet, p. 76; Appendix C cont. p. 48.

Fig. 4. Orthoceras thoas.
Fifteenth Report on the State Cabinet, p. 75; Appendix C cont. p. 47.

Fig. 5. Orthoceras hyas.
Fifteenth Report on the State Cabinet, p. 75; Appendix C cont. p. 47.

Fig. 6 & 7. Orthoceras foliatum.
Fifteenth Report on the State Cabinet, p. 74; Appendix C cont. p. 46.
Fig. 6, the interior of a portion of the shell, showing the lamellose extensions into the surrounding stone; 7, a cast, or imprint, showing the sinuosity of the lamellose extensions on the anterior side.

Fig. 8. Orthoceras profundum.
Fifteenth Report on the State Cabinet, p. 76; Appendix C cont. p. 48.

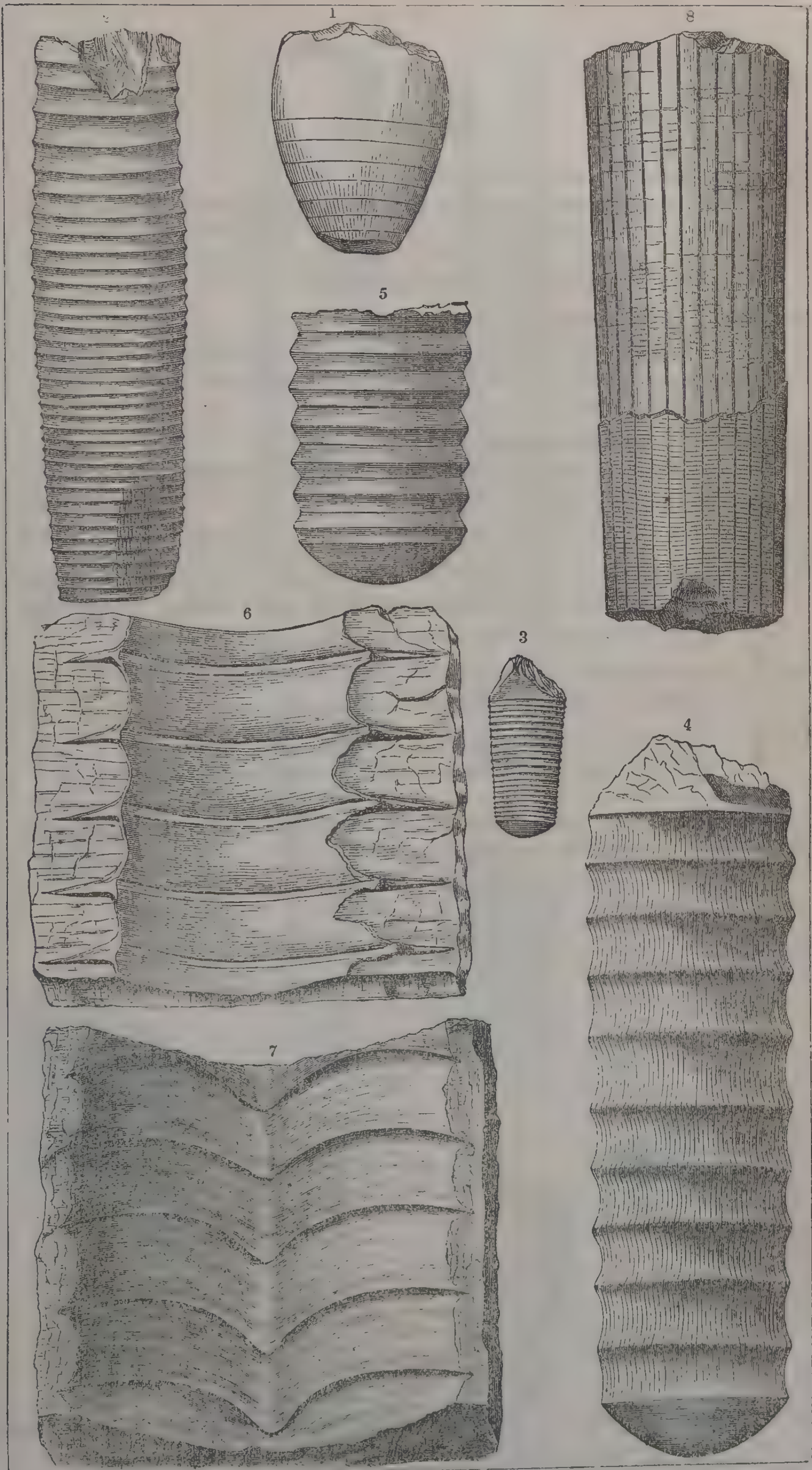
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PLATE 8.

Fig. 1 & 2. ORTHOCERAS CROTALUM.

Fifteenth Report on the State Cabinet, p. 78; Appendix C cont. p. 50.

Fig. 1 represents the ordinary form and condition of the specimens.

Fig. 2, a variety of the preceding, or perhaps a distinct species, having the direction of the septa and the annulations not coincident.

Fig. 3 & 4. ORTHOCERAS NUNTIUM.

Fifteenth Report on the State Cabinet, p. 79; Appendix C cont. p. 51.

Fig. 3, a cast of an imperfect individual; 4, a fragment preserving the surface markings.

Fig. 5. ORTHOCERAS EXILE.

Fifteenth Report on the State Cabinet, p. 78; Appendix C cont. p. 50.

Fig. 6. ORTHOCERAS BACULUM.

Fifteenth Report on the State Cabinet, p. 74; Appendix C cont. p. 46.

Fig. 7. ORTHOCERAS EMACERATUM. A species resembling *O. exile*; but the septa are proportionally much more distant, there being three in this one in the space of four in the preceding*.

Fig. 8. GOMPHOCERAS (APIOCERAS) CONRADI.

Thirteenth Report on the State Cabinet, p. 106.

Fig. 9. APLOCERAS (CYRTOCERAS) LIRATUM.

Fifteenth Report on the State Cabinet, p. 72; Appendix C cont. p. 44.

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* The description of this species should follow that of *O. exile*, p. 78 of this Report (p. 60 Appendix C, 1861); it having been accidentally omitted.

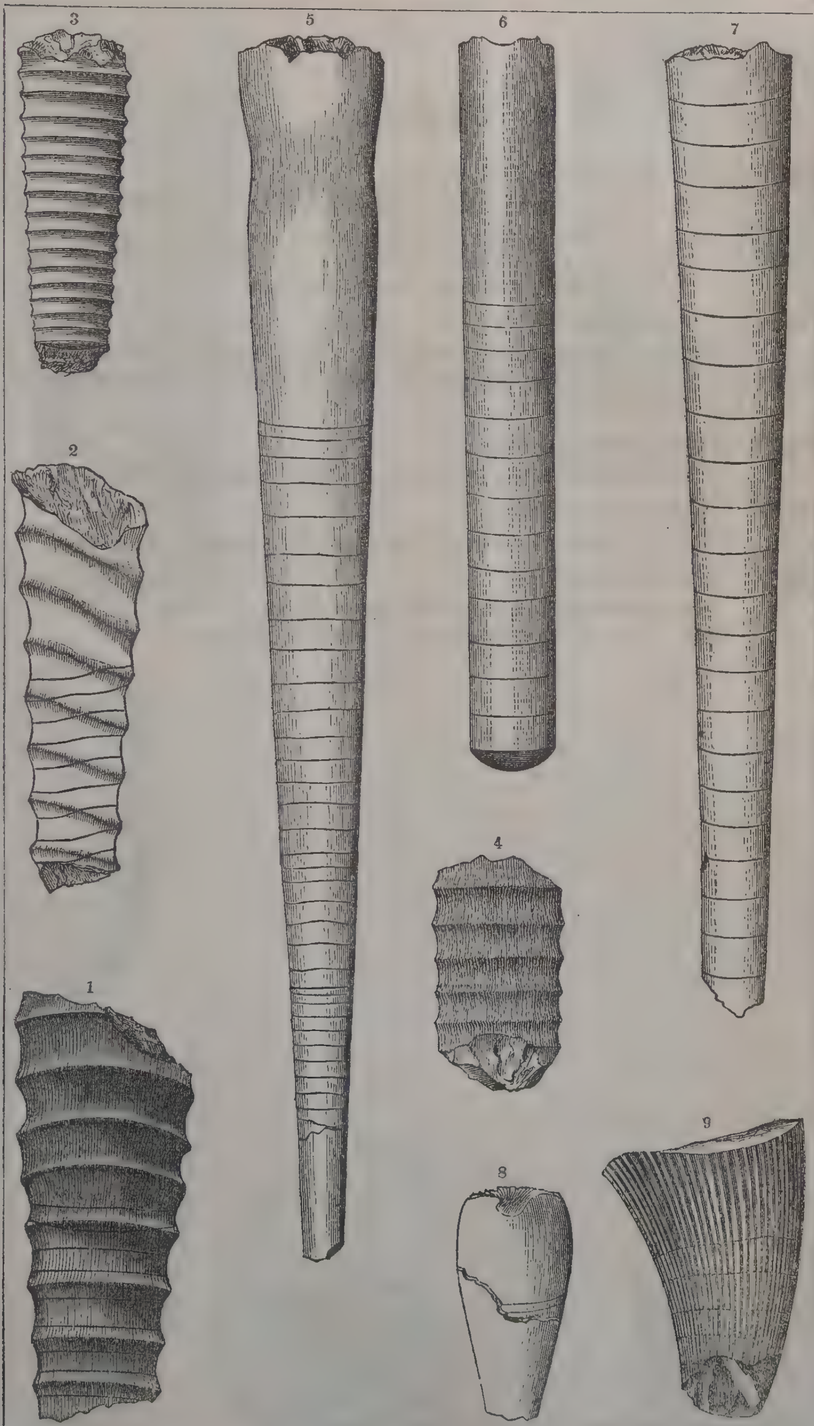
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PLATE 9.

Fig. 1, 2 & 3. CYRTOCERAS EUGENIUM.

Fifteenth Report on the State Cabinet, p. 70; Appendix C cont. p. 42.

Fig. 1, outline of the form; 2, a fragment (dorsal view) preserving a part of the shell, and showing the lines of septa; 3, a portion of the shell near the aperture, showing the sinus in the anterior margin.

Fig. 4 & 5. GYROCERAS NEREUS.

Fifteenth Report on the State Cabinet, p. 67; Appendix C cont. p. 39.

Fig. 4, outline of an imperfect specimen; 5, illustrating the character of the lamellose surface.

Fig. 6. CYRTOCERAS MORSUM.

Fifteenth Report on the State Cabinet, p. 71; Appendix C cont. p. 43.

Fig. 7. CYRTOCERAS METULA.

Fifteenth Report on the State Cabinet, p. 72; Appendix C cont. p. 44.

Fig. 8. TROCHOCERAS CLIO.

Fourteenth Report on the State Cabinet, p. 108.

Fig. 8, view of the lower side of an imperfect specimen.

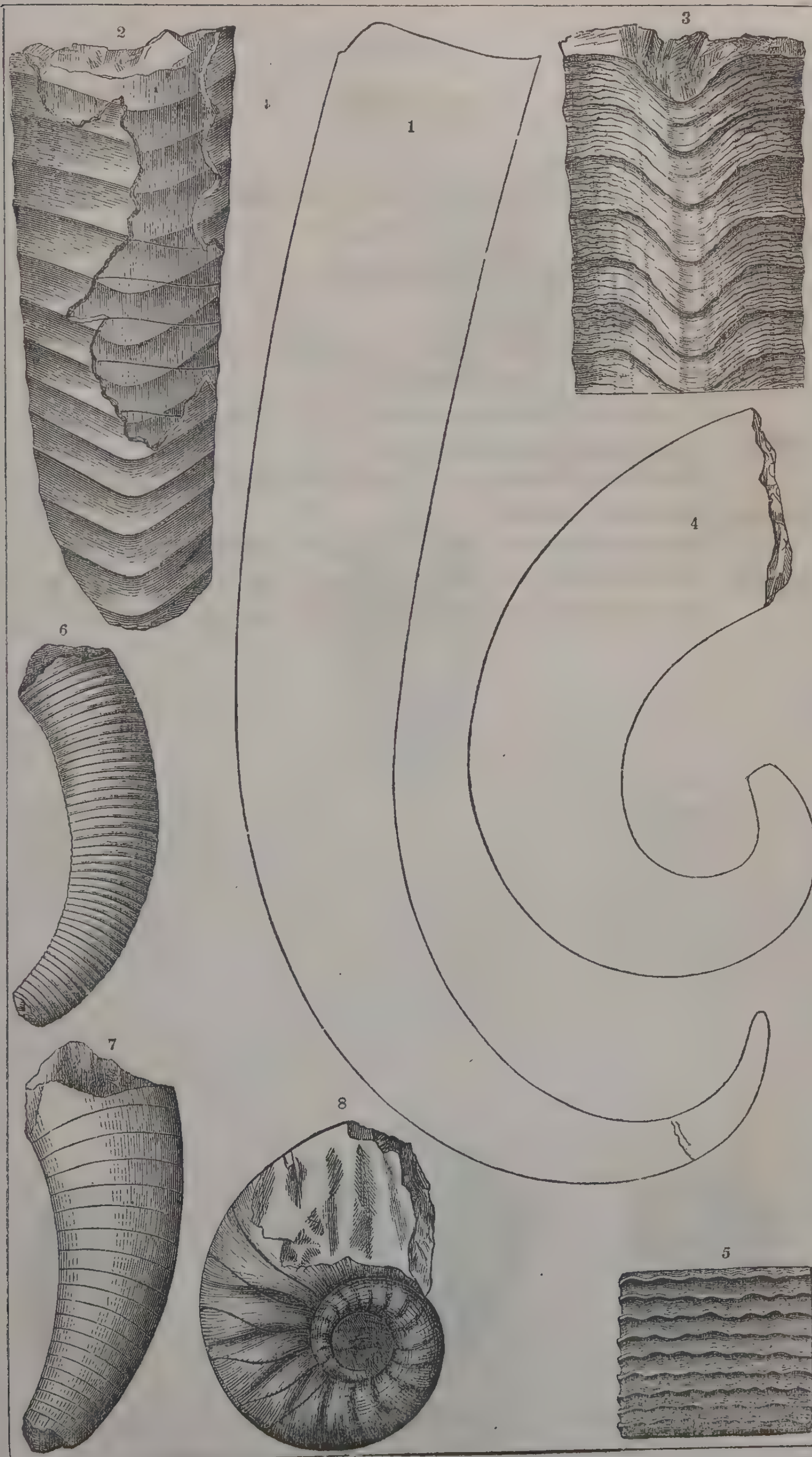
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PLATE 10.

Fig. 1. Clymenia erato.
Fifteenth Report of the Regents on the State Cabinet, p. 64; Appendix C continued, 1861, p. 36.

Fig. 2 – 5. Calymene christyi.
Thirteenth Report on the State Cabinet, p. 118.

Fig. 6. Proetus haldemani.
Fifteenth Report on the State Cabinet, p. 102; Appendix C cont. p. 74.

Fig. 7 – 9. Proetus longicaudus.
Fifteenth Report on the State Cabinet, p. 108; Appendix C cont. p. 80.

Fig. 10. Proetus crassimarginatus.
Fifteenth Report on the State Cabinet, p. 100; Appendix C cont. p. 72.

Fig. 11. Dalmania boothi.
Fifteenth Report on the State Cabinet, p. 91; Appendix C cont. p. 63.

Fig. 12. Phacops rana (= Phacops bufo, *var.* rana : Green).
Fifteenth Report on the State Cabinet, p. 93; Appendix C cont. p. 65.


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NOTICE.

In the Thirteenth Report of the Regents on the Cabinet of Natural History, 1860, I presented the results of some investigations upon certain genera of Brachiopoda, made at intervals in the course of the two preceding years. This Report was mainly printed during my absence; and the observations upon the Genera Athyris (= Spirigera), Merista, Camarium and Meristella were printed according to the accompanying text.

Having taken one of the types of Merista as indicated by Mr. Davidson (the *M.* (*Atrypa*) *tumida* of Dalman) as a guide in determining the characters of the genus, I had previously separated certain forms, with a transverse septum in the interior of the ventral valve, under the generic name of Camarium. Being in correspondence with Mr. Davidson, I had stated to him the grounds of my proposed separation of the genera; and it was only on my return to Albany in the early part of November, that I found a letter from that gentleman, in which he says, that since the typical species of Suess do possess "the shoelifter process," the name Merista must be retained for those having that character.

Although the figures of Merista given by Davidson in his work are not as distinctive as could be desired in regard to this arching septum or shoelifter process, I nevertheless beçame satisfied that my proposed Genus Camarium was identical with Merista.

On inquiry, I found that the Report had not been published, but was waiting for the plates of the first part; and, desirous of making the correction as early as practicable and as complete as possible, I procured the reprinting of a few pages, introducing the requisite changes, in preference to adding a postscript, or waiting for the next Annual Report.

It would appear that a copy of these first printed sheets fell into the hands of Prof. B. Silliman Jr., and were made the subject of criticism in the American Journal of Science; the writer expressing great solicitude in reference to the changes made, and proffering advice to the Regents in regard to the "original text" of their Reports.

Having retained no copy of the sheets myself, I requested, through a friend, that Mr. Silliman would allow me the use of his copy of the pages for publication, which was refused; and it was only after

several months that I became aware of the existence of another copy in the hands of Mr. Paterson, and I here communicate a reprint of it, in order that the scientific world may know what was originally printed.

At the same time, some additional matter, the results of previous studies, was added to the Report; in regard to which, that there might be no misapprehension, I sent a note to the printer, to be inserted at the end, stating that additions had been made during 1860*. To honest minds, there could be no difficulty in appreciating my motive for appending that notice. I could gain nothing *in time* by adding this new matter to the Report : I could as well have printed and circulated it separately, and with the date of publication. There is no antedating, nor attempt at antedating : the Report was published in December, 1860. The delay in publication was due simply to the non-completion of the engraving of plates belonging to the preceding part of the Report; and this gave me an opportunity of making the corrections, and adding other matter.

* I was subsequently informed by the printer that this note did not reach him till the last form was in press, and consequently it does not appear in some of the first impressions.

OBSERVATIONS ON THE GENERA *ATHYRIS* (= *SPIRIGERA*), *MERISTA*, *CAMARIUM* AND *MERISTELLA*.

Among the fossils referred for many years to Terebratula, Atrypa, etc., European authors have separated the Genera Spirigera and Merista; shells which have many characters in common, and which were indeed at first united under Spirigera or Athyris, until in 1851 the Genus Merista was proposed by Prof. Suess. In my later studies of the Brachiopoda of the American palæozoic strata, I have referred to the Genus Spirigera certain species which have a subglobose or ovoid form, with lamellose surfaces and without, or with scarcely perceptible radiating striæ; while other forms, which are less distinctly lamellose and always more or less distinctly radiatingly striate with fine concentric lines of growth, I have referred to the Genus Merista. Many of the latter have the general form and surface-characters of *Merista* (*Atrypa*) *tumida*, Dalman, but are less ventricose: they all have internal spires, and, when perfect, the beaks appear to be imperforate. The radiating striæ, though visible in well-preserved specimens, are still more conspicuous in the partially exfoliated shell.

I proposed last year* a separation of certain Merista-like forms, under the name Camarium, on account of the presence of an arching transverse septum in the ventral valve. Subsequently, a more careful consideration of the characters of Merista as given by Mr. Davidson, and an inspection of his figures, have shown me that this arching septum, in its attenuation towards the beak, is identical with the shoelifter process described as belonging to the Genus Merista. An examination of numerous specimens of different species of those which I have referred to the Genus Merista, shows no evidence of this process or septum; and the deep muscular impression below the rostral cavity, and the thickening of this part of the shell, are characters incompatible with the existence of the septum. Moreover I conceive that this arching septum, or the extension of the shoelifter process into the cavity of the valve, would produce such a modification of the soft parts of the animal, that the inhabitants of these shells were generically distinct from the inhabitants of the large uninterrupted cavity of the shells which I have referred to Merista.

In order, if possible, to reach a solution of the question, I have had the shell removed from a solid specimen of *M. tumida*†, which is one of the types of the genus, and there is certainly no evidence of the septum or shoelifter process, but, on the contrary, the presence of all the characters marking the American species which I have referred to Merista in Vol. iii, Pal. New-York. At the same time, the *Merista* (*Terebratula*) *scalprum* of Barrande, in the most solid of the specimens which I possess, readily reveals the presence of the septum.

Since, therefore, the *Merista tumida* (Dalman) and *M. herculea* (Barrande) are made the types of the Genus Merista‡, and the external and internal cha-

* In the Thirteenth Report of the Regents on the State Cabinet: Also Supplement to Vol. iii, Pal. N.York.

† A specimen from Dudley, England, which does not differ materially from an authentic Swedish specimen; and Prof. M'Coy has pronounced the Swedish and Dudley specimens identical.

‡ In my original observations upon the Genus Camarium, I had supposed that the presence of the strong arching septum in the ventral valve might be incompatible with the existence of internal spires; but since these spires do exist in *M. scalprum*, I can have no hesitation in crediting their existence in our Camarium.

racters of these are common to numerous well-marked forms in our Silurian strata which show no evidence of the septum described, I advocate the restriction of the generic designation to species of that type. At the same time, believing as I do that the characters shown in the valves of CAMARIUM are incompatible with an animal like that inhabiting MERISTA, I feel compelled to advocate the separation of these forms, and to maintain the Genus CAMARIUM, adding, to the characters first given, that it contains internal spires* as in MERISTA and SPIRIGERA.

With this restriction, the Meristæ proper consist of smooth, ovoid, circular or transverse shells, with usually a conspicuous sinus upon the ventral valve, and a corresponding wide mesial fold or elevation upon the dorsal valve. The hinge articulation is not very different from that of SPIRIGERA, to which they are allied; but those which I have regarded as true Meristæ have a deeply marked triangular muscular area just below the rostral cavity of the ventral valve, which is bordered on the anterior side by a callosity of the shell, and on the other two sides by the strong dental lamellæ. This feature is not conspicuous in SPIRIGERA : the dental lamellæ in that genus are shorter and less strong, and the form of the muscular impression is different. The dorsal valve of MERISTA has a longitudinal median septum; a feature which is obsolete, or partially obsolete, in the species of SPIRIGERA. The species of CAMARIUM have the external form of MERISTA, but the wide transverse arching septum in the ventral valve serves to distinguish it from MERISTA or SPIRIGERA.

The Meristæ begin their existence, so far as we know, in the rocks of the Clinton group; and in this and the Niagara group there are several species, while they are more numerous in the Lower Helderberg group: they occur likewise in the Upper Helderberg rocks, and in the Hamilton group. CAMARIUM appears first in the Lower Helderberg period, while SPIRIGERA is known in a single species for the first time in the Hamilton group.

In the period of the Hamilton group, other new forms appear, apparently allied to MERISTA, but marked by plications on the mesial fold and sinus, and sometimes with obscure or distinct plications on the lateral portions of the shell.

The internal structure appears to be the same as in MERISTA, and the fine obscure radiating striæ and fine cancellating concentric lines appear both upon the surface and upon the exfoliated shell. In these forms the substance of the shell is always thin, and the individuals are never so gibbous as in the species of the three allied genera.

Some of these forms approach RHYNCHONELLA; but the plications are more rounded, and rarely or never continued to the lateral margins, which are more compressed than in RHYNCHONELLA proper. The internal structure appears, so far as ascertained, to be the same as in MERISTA.

For these forms, I propose the generic name MERISTELLA.

GENUS MERISTELLA (n. g.).

SHELLS variable in form, ovoid, circular or transverse : valves more or less equally convex, with a median sinus upon the ventral valve and a corresponding elevation upon the dorsal valve; beaks imperforate, that of the ventral valve curving over the smaller valve. Surface more or less strongly plicated; the mesial fold and sinus always plicated, the lateral portions being sometimes nearly or quite free from plications; concentrically marked by fine lines of growth and some stronger imbricating lamellæ. Substance of shell thin : structure distinctly

* I have not seen the original description of this genus by Prof. SUESS.

fibrous. Valves articulating by teeth and sockets. Interior of ventral valve with two short diverging dental lamellæ, which extend into and are affixed to the sides or bottom of the rostral cavity. The muscular impressions occupy a narrow triangular cavity below the bases of the lamellæ, and usually extend about one-third the length of the shell. Dorsal valve with a well-defined median septum, which extends half the length of the shell : the hinge-plates are narrow and strong processes, embraced by the curving teeth of the opposite valve.

In numerous specimens examined, there is no evidence of internal spires; and it is only the similarity of these forms to Merista and Spirigera, that affords an argument in favor of the existence of these appendages.

The types of this genus are *Atrypa quadricosta* and *A. mesacostalis* (Hall, Geol. Report of the Fourth District of New-York = *Meristella quadricosta* and *M. multicosta* described in this paper, from the shales of the Hamilton group.

The following figures will serve to illustrate more fully the characters and differences of these genera, as given above.

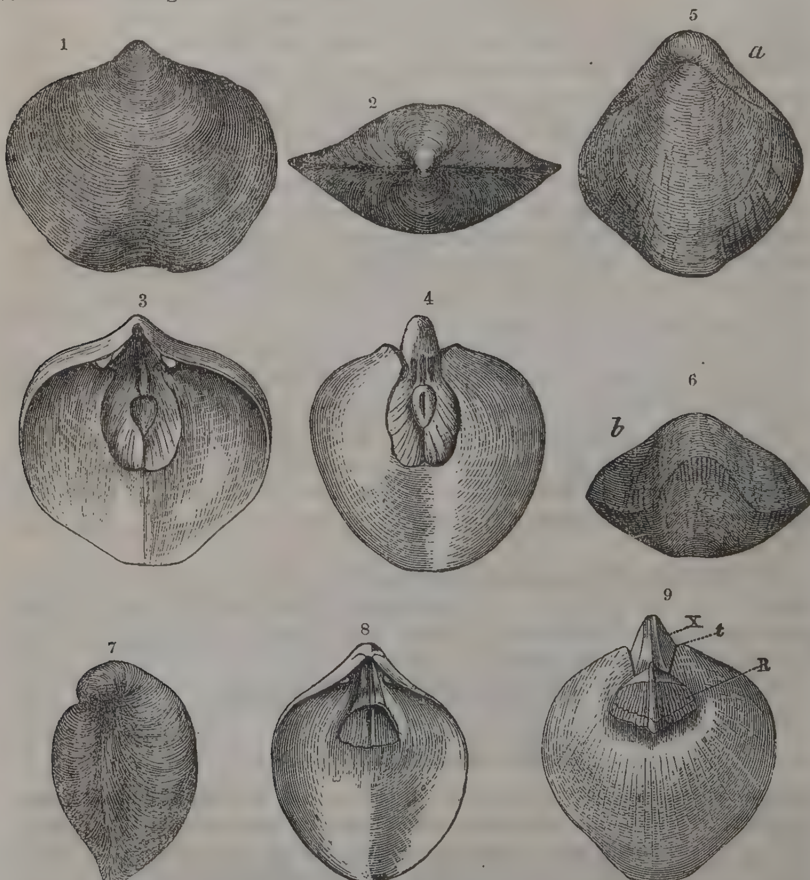

Fig. 1 & 2 are of the exterior, and 3, 4 the interior and cast of *Athyris spiriferoides* from the Hamilton group, N.York.

Fig. 5, 6 & 7 : Dorsal, front and profile views of *Merista princeps* of the Lower Helderberg. 8, 9 are the interior and cast of the ventral valve as shown in a species of the age of the Upper Helderberg limestones, Ohio : the letter x refers to the filling of rostral cavity; *t*, the cavities of the dental lamella; r, the triangular muscular impression.

10 11 12 13

14 15

FIG. 10 & 11. Dorsal and profile views of *Camarium typum* : 12, interior of the ventral valve; 13, longitudinal section; *a*, rostral cavity; *s*, transverse arching septum, or "shoe-lifter" process of KING; *t*, teeth.

FIG. 14 & 15 illustrate the exterior form and characters of *Meristella multicosta* of the Hamilton group, and may be considered as illustrating the general external characters of the genus.

DESCRIPTIONS OF NEW SPECIES OF FOSSILS,

CHIEFLY FROM THE HAMILTON GROUP OF WESTERN NEW-YORK.

LINGULA LIGEA (n.s.).

SHELL narrow elliptical; length equal to twice the width; sides regularly curving; extremities subequal; margins of the valves thickened. Surface marked by fine concentric striæ, and by a few obscure or obsolete radiating striæ. The more convex valve shows, along the inner margin, a narrow shallow groove as if the edge of the opposite valve closed just within its margin.

The shell is of more equal width throughout and more symmetrically oval, and is much larger than the *L. spatulata* of the Genesee slate.

Geological formation and locality. In the shales of the upper part of the Hamilton group, on the shore of Seneca lake; and near the base of the Portage group, at the falls below Trumansburgh, N.York.

LINGULA PALÆFORMIS (n.s.).

SHELL broadly subovate, convex at the umbo and depressed below, the length a little greater than the greatest width, rapidly expanding for about two-thirds the length of the shell, below which it is abruptly rounded: shell thick. Surface marked by strong concentric lamellose striæ, and, in the exfoliated surface, by fine radiating striæ.

Geological formation and locality. In the shales of the Hamilton group, associated with numerous known fossils, in a loose fragment of rock in the valley south of Cayuga lake.

LINGULA EXILIS (n.s.).

SHELL broad ovate, moderately convex, length little greater than width; apex obtuse; cardinal margin obtusely rounded; sides regularly curving; base broadly rounded Surface lamellose with irregular rugæ or lines of growth.

This species is very broad; and the great width at the apex, and broadly rounded cardinal extremity, distinguish it among all the other forms of the Hamilton group or of the rocks of New-York.

Geological formation and locality. In the Marcellus shale, near Bridgewater, New-York.

DISCINA ALLEGHANIA (n.s.).

SHELL broadly elliptical or nearly circular. Dorsal valve depressed conical; anterior side broadly and equally convex; apex placed at a little more than one-third the length from the posterior end of the shell, slightly inclined backwards; the posterior slope concave, and the shell flattened towards the margin. Surface marked by fine regular concentric lamellæ, which are distant from each other two or three times their width.

This large species is one of the finest and most beautiful of the genus, nearly equal in size to the *Discina grandis* of the Oriskany sandstone, and differing from that one in the posterior position of the apex and the more abrupt sloping on the posterior side, while the concentric striæ are much finer and more closely arranged. It differs from the large circular form *Discina discus* of the Lower Helderberg group, in the greater elevation of the dorsal valve, aud absence of radiating striæ.

Geological formation and locality. In the Chemung group, Hobbieville, Allegany county, New-York.

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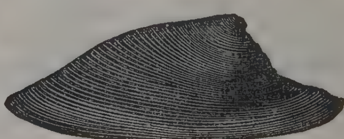

1a

DISCINA ALLEGHANIA.

CRANIA HAMILTONIÆ (n.s.).

SHELL subconical, subcircular; apex subcentral, pointed in well-preserved specimens, often worn or decorticated. Exterior surface of the dorsal or upper valve lamellose. Ventral or lower valve marked by four strong muscular impressions, which are variable in form: the two lateral ones are distant, and each apparently double; the central impressions approximate, diverging above and assuming a somewhat cordiform appearance; vascular impressions strongly digitate.

This species is found adhering to valves of *Tropidoleptus*, *Strophodonta*, *Spirifer*, *Spirigera*, *Avicula*, *Orthoceras;* and the separated valves are free in the shales.

Geological formation and localities. In the shales of the Hamilton group: Western New-York, Maryland, and Virginia.

CRANIA CRENISTRIATA (n. s.).

Ventral or upper valve very depressed conical, subcircular in outline; apex central or subcentral, a little inclined. Surface marked by sharp elevated crenulate striæ reaching almost to the apex (which is quite smooth), and increasing by interstitial additions.

This species is quite rare, and two specimens only of the ventral valve are known at this time. The sharp elevated striæ give the fossil, when partially obscured by adhering shale, the appearance of the exterior of the small funnelshaped fronds of Fenestella.

Geological formation and locality. In shales of the Hamilton group, Ontario county, N.York.

CRANIA LEONI (n. s.).

Shell subcircular, transverse or slightly elongate. Dorsal valve convex : ventral valve concave, variable in form. The shell, towards the margin, is more abruptly recurved : hinge-line straight, equal to a little more than one-third the width of the shell. Muscular impressions of the posterior adductors in the dorsal valve near the cardinal angles; the anterior ones near together and a little behind the centre, with two minute impressions a little anterior to the centre, marking the place of the retractor muscles. Ventral valve with the posterior adductors corresponding to those of the dorsal valve; the anterior adductors occupying a subcircular area, and barely separated by an elevation marking the place of the protractor muscle.

This species is known only in the condition of casts of the interior. The dorsal side is moderately convex; the apex apparently a little excentric on the posterior side.

Geological formation and locality. In the Chemung group: Leon, Cattaraugus county, N.York.

ORTHIS LEPIDUS (n. s.).

Shell small, transversely subelliptical, somewhat ventricose : cardinal line little less than the greatest width of the shell; area proportionally large; beaks distant. Ventral valve very convex, regularly curved from beak to base : beak prominent, pointed, slightly incurved. Dorsal valve depressed convex, marked by a distinct mesial depression, which, in some specimens, extends nearly to the beak : beak small, pointed, and but little incurved. Surface marked by fine radiating striæ, crossed by concentric striæ and a few lines of growth.

This is the smallest species of Orthis yet known in the Hamilton rock of this country, and is easily characterized by the great transverse diameter, the proportionally large area, the prominent beak of the ventral valve, and the distinct sinus of the dorsal valve.

Geological formation and locality. In shales of the Hamilton group : Ontario county, N.York.

ORTHIS CYCLAS (n. s.).

Shell small, varying from subcircular to transversely subelliptical, moderately convex : beaks appressed, not distant; cardinal line rather less than one-half the greatest width of the shell. Ventral valve convex, most gibbous near the umbo : beak small, slightly incurved; area rather low. Dorsal valve the less convex, sometimes marked by a shallow depression : beak very small, slightly projecting beyond the cardinal line; area small. Surface marked by strong sharp

prominent striæ, which are both bifurcated and implanted, often appearing fasciculate near the margin of the shell.

The largest specimens known of this species measure not more than three-eighths of an inch in the greatest diameter. The distinguishing features are the coarse prominent striæ and the length of the cardinal line.

Geological formation and locality. Shales of the Hamilton group: Western New-York.

ORTHIS PENELOPE (n. s.).

SHELL large, oblate, the proportions of length and breadth usually as four to five, plano-convex: hinge-line about two-fifths of the breadth of the shell. Ventral valve flat or slightly convex: beak somewhat elevated; foramen broad, triangular. Dorsal valve regularly convex, with a very slight depression: beak small, rising but little beyond the general outline of the shell; area smaller than that of the opposite valve.

Surface marked by fine radiating bifurcating striæ, which are strongly arched upwards near the cardinal extremities, and crossed by fine concentric striæ, giving a slightly rugose appearance in well-preserved specimens; and, besides these, are closely arranged lamellose lines of growth. The radiating striæ have the appearance of being broken, from the peculiar manner in which the pores open upon the surface.

Interior of the ventral valve marked by a subcircular foliate muscular impression, which occupies more than half the length and breadth of the valve, and, in old specimens, is extremely thickened from its anterior margin nearly to the border of the palleal impression. Interior of the dorsal valve marked, in old specimens, by a similar imprint, but smaller and less distinctly defined. The cardinal and brachial processes are strong and prominent, directed downwards into the opposite valve: the cardinal process fills the broad foramen of the ventral valve, and appears as an angular ridge on the exterior of the area.

This species is much larger than *O. vanuxemi*, with which it is associated; often measuring more than one and three-quarters inches in transverse diameter, while the largest specimens of *O. vanuxemi* seldom measure more than one inch. It differs also in the character and strength of the radiating striæ; the muscular imprint of the ventral valve is usually broader and more strongly marked; the cardinal and brachial processes of the dorsal valve are stronger, and directed towards the opposite valve, while those of *O. vanuxemi* are inclined forward or into the cavity of the dorsal valve.

Geological formation and locality. Shales of the Hamilton group: Western New-York.

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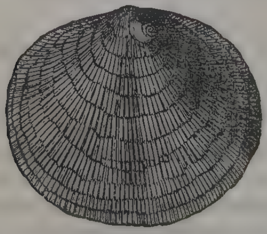

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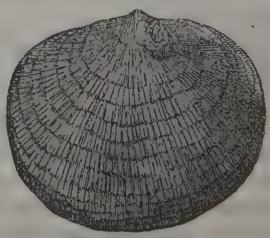


FIG. 1 & 2. Dorsal and ventral valves of *Orthis penelope*. One of these figures was used in the Regents' Report of 1847, to illustrate *Orthis vanuxemi*, with which this species was at that time included.

ORTHIS LEUCOSIA (n. s.).

SHELL broad ovate, greatest breadth below the middle, obtusely pointed at the beaks. Valves moderately convex : cardinal area short and small; beaks approximate, pointed and incurved. Ventral valve depressed convex, most gibbous at the umbo and flattened towards the front, without a distinct mesial sinus, but sometimes having a broad shallow curve at the anterior margin of the shell : foramen broad triangular. Dorsal valve much the more gibbous, the greatest convexity above the middle, marked along the middle by a very slight depression which is sometimes obsolete : area smaller than that of the opposite valve, curved and slightly overhanging. Surface marked by fine radiating bifurcating striæ, crossed by strong distant lamellose lines of growth, and interrupted by the openings of the pores. Interior of ventral valve marked by a strong, foliate, somewhat elongate muscular impression.

This species is allied to *O. vanuxemi*, but differs in the cardinal margin being nearly straight from the beaks to nearly one-third the length of the shell, while in that species it is usually regularly curved : it differs also in the area being much smaller, and the beaks incurved and closely approximate.

Geological formation and locality. Shales of the Hamilton group : Ontario county, N.York.

ORTHIS SOLITARIA (n. s.).

SHELL small, subcircular or broadly ovate : valves unequally convex; hinge-line somewhat more than one-half the greatest width of the shell. Ventral valve highly convex : beak small, prominent, slightly incurved; area low and well defined. Dorsal valve depressed convex, most prominent near the umbo; a broad shallow mesial sinus at the anterior margin, which does not extend beyond the middle of the shell : beak small, not prominent; area linear. Surface marked by fine radiating bifurcating striæ and strong concentric lines of growth.

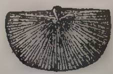
This shell is of the type of *O. elegantula*. It differs from any other in the Hamilton group, except *O. lepidus*, in having the ventral valve more convex than the dorsal, the sinus being on the dorsal valve. From *O. lepidus* it differs in being longer than wide, with less prominent beak and smaller area : it is also a larger species, being more than half an inch in diameter.

Geological formation and locality. Shales of the Hamilton group : Livingston county, N.York.

ORTHISINA ARCTOSTRIATA (n. s.).

SHELL small, semicircular or semielliptical : hinge-line straight, nearly equal to the greatest width of the shell. Ventral valve irregularly gibbous : beak small, pointed, and truncate from its adhesion to foreign substances; area moderate, slightly arcuate, and somewhat irregular on the two sides; pseudo-deltidium broadly triangular, closed. Dorsal valve depressed convex; area narrow linear. Surface marked by strong sharp close radiating crenulated striæ, which increase by interstitial addition, and crossed by strong concentric lines of growth.

Geological formation and locality. Shales of the Hamilton group : Ontario county, N.York.



ORTHISINA ARCTOSTRIATA.

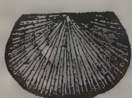
FIG. 1. Ventral view of a medium-sized specimen.
FIG. 2. Enlarged cardinal view of another specimen, showing the closed rounded pseudo-deltidium.

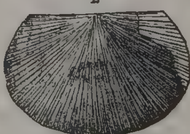
ORTHISINA ALTERNATA (n.s.).

SHELL of medium size, semielliptical : hinge-line shorter than the greatest width of the shell; cardinal extremities rounded. Ventral valve most gibbous near the umbo and depressed near the front : area moderate, somewhat arcuate; pseudo-deltidium large, broad at base, imperforate, marked along the middle by a deeply impressed line. Dorsal valve regularly convex, apparently without sinus; area linear or obsolete. Surface marked by fine radiating striæ, alternating in size, usually three smaller between the larger ones near the margin of the shell; distinctly undulating concentric striæ. The margin of the shell is extremely thin.

This species differs from the last in the proportionally shorter hinge-line and the alternating larger and smaller striæ, which are also less prominent and less closely arranged.

Geological formation and locality. Shales of the Hamilton group : Genesee county, N.York.





ORTHISINA ALTERNATA.

FIG. 1. Dorsal valve of a small individual. FIG. 2. Dorsal valve of a larger individual.

AMBOCŒLIA GREGARIA (n.s.).

Compare with *Atrypa unguiculus*, SOWERBY, Geol. Transactions, Vol. v, pl. 54, f. 8.
Spirifer unguiculus, PHILLIPS, Pal. Fossils, pl. 28, f. 119.
Orthis unguiculus, HALL, Geol. Report Fourth District of New-York, p. 268, f. 5 *a, b, c, d* ; p. 267.

SHELL subhemispherical, wider than long : hinge-line straight; cardinal angles rounded. Ventral valve gibbous, marked by a shallow mesial sinus, which extends from near the beak to the base of the shell: beak obtuse, strongly incurved. Dorsal valve semielliptical, depressed convex, with sometimes a slight longitudinal central depression; foveal plates slender and parallel.

This species differs from *A. umbonata* in the less regular convexity of the ventral valve, the greater convexity of the dorsal valve, and the proportionally greater transverse diameter.

I had originally considered this shell as identical with *Atrypa unguicula* (SOWERBY, *Spirifer unguiculus* (PHILLIPS), placing it under the Genus ORTHIS; but farther comparison of figures and descriptions has convinced me that it is quite distinct.

A variety (*A. crassa*), which has not thus far afforded the means of separation as a distinct species, has the bases of the dental lamellæ thickened, and extended in strong ridges across the valve on each side obliquely to the anterior lateral margins, leaving the central part of the shell of the ordinary thickness.

Geological formation and locality. In shaly sandstone of the Chemung group, crowded together in great numbers in some beds : Paintedpost, Jasper, Steuben county; near Ithaca in Tompkins county, and in Chautauque county.

VITULINA PUSTULOSA (n. s.).

SHELL plano-convex, semicircular : hinge-line equal or nearly equal to the greatest width of the shell; area large, triangular, reaching to the extremities of the cardinal line. Ventral valve highly convex, the greatest convexity at the umbo : beak small, pointed, somewhat incurved over the area; foramen very broad, equalling half the length of the cardinal line. Dorsal valve flat or slightly convex, having a broad shallow sinus, flat or with an incipient fold in the bottom. Surface marked by about ten moderately strong simple rounded radiating plications, two of which are slightly elevated in the middle of the ventral valve, in form of a mesial fold corresponding to the sinus of the dorsal valve; the entire surface beautifully covered with minute pustules resembling spine-bases.

Geological formation and locality. In the limestone of the upper part of the Hamilton group : Genesee county, N.York.

SPIRIFER VENUSTUS (n. s.).

SHELL subrhomboidal, ventricose, length about two-thirds the greatest width : hinge-line scarcely equalling the greatest width of the shell; ardi nal extremities rounded. Dorsal valve very convex; mesial fold narrow above and expanded in front. Ventral valve less convex than the opposite, broadly arching from the extremities, the greatest convexity a little above the middle : beak arched; area short, rounded, and not defined at the margins; foramen high, the height equal to the width at the base; mesial sinus narrow and well defined near the beak, broader below the middle and expanded in front, terminating in a broad triangular extension. Surface marked by numerous fine bifurcating plications, the mesial sinus margined by a stronger plication; at the beak there is a single one in the centre which sometimes continues simple to the base, while the accessions take place from the lateral ones, till there are 10, 11, or 12 within the limits of the sinus near the base : plications crossed by arching lamellose striæ, which are granulose or fimbriate on the margins.

This is one of the finest species of SPIRIFER in the Hamilton group, and equal or superior in size and beauty to *S. granulifera*. It is the only species in this group which has bifurcated plications, or plications on the mesial fold and sinus. The largest specimen is about three inches wide, by nearly two inches long. In general aspect and surface characters, this species resembles the finer specimens of *S. cameratus.*

Geological formation and locality. Shales of the Hamilton group : Livingston county, N.York.

TREMATOSPIRA GIBBOSA (n. s.).

SHELL transversely subelliptical, once and a half as wide as long, ventricose, the anterior margin thickened in old specimens; valves subequally convex. Beak of

ventral valve strongly arcuate, and truncated by a circular perforation which is completed on the inner side by the outer ends of the small deltidial plates; false area small, broad triangular. Beak of the dorsal valve abruptly incurved, and concealed by passing within the concavity of the area of the opposite valve. Surface marked by nine strong angular elevated plications; three in the centre of the dorsal valve more approximate, giving the appearance of a mesial elevation, and three correspondingly depressed on the ventral valve : concentric lamellæ of growth at irregular distances, undulated in crossing the plications, give a series of zigzag lines. Entire surface finely granulose. Shell-structure strongly punctate.

This species differs from every other described, in its extreme gibbosity and highly elevated angular plications.

Geological formation and locality. Shales of the Hamilton group : Western New-York.

RHYNCHOSPIRA NOBILIS (n.s.).

Shell large, broadly subovoid, ventricose. Dorsal valve the more gibbous, with a broad moderately elevated mesial lobe. Ventral valve with a broad mesial sinus: the beak large and truncated by a large round foramen, the lower side of which is bounded by the summits of the deltidial plates : margins of the valve subalate a little below the beak. Surface marked by numerous angular elevated plications, which are sharply crenulated on the summits; the sides and intermediate spaces finely and evenly striated. In the mesial fold there are from nine to eleven plications elevated, and a corresponding number in the sinus of the opposite valve.

The dorsal valve shows strong crural processes extending from the hinge-line for a short distance, when they become slender and flattened, and below this they curve and send off a process towards the centre of the shell, as in others of the genus, and similar to that of Terebratula.

This is the largest species of Rhynchospira now known. It differs conspicuously from the other species, in the defined mesial fold and sinus, and sharply elevated plications.

Geological formation and locality. Hamilton group : Livingston and Erie counties.

RHYNCHOSPIRA LEPIDA (n.s.).

Shell small, broadly suboval. Ventral valve depressed convex, regularly arched from beak to base : beak prominent, pointed, slightly incurved, foramen triangular, closed by two convex deltidial plates which are excavated on their inner and upper margins, forming an elongate or oval perforation. Dorsal valve the less convex, most gibbous above the centre. Surface marked by about twenty-four fine simple radiating plications; five in the middle of the valves stronger, distinctly elevated on the ventral valve. These stronger plications extend, giving a protruding form to the front of the shell.

This species differs from the others of this genus, in the flatness of the valves, fineness of the plications, and general form.

Geological formation and locality. Shales of the Hamilton group : Ontario county.

ATRYPA PSEUDOMARGINALIS (n.s.).

SHELL trilobate, subcircular, with the beak of the ventral valve extended. Dorsal valve with mesial fold strongly defined below the first third of the shell, and elevated in front. The mesial sinus does not extend to the beak. Plications rounded, irregularly bifurcating.

This species resembles *Atrypa marginalis* of DALMAN, but is larger and more robust, the beak less attenuate, the mesial fold and sinus broader and not extending to the beak, and the striæ coarser and not as much recurved. From the Bohemian specimens under the same name, it differs in the greater elevation and rounded form of the mesial lobe, and the less angular plications.

Geological formation and locality. Upper Helderberg limestone : Schoharie.

MERISTA HASKINI (n.s.).

SHELL broadly ovate, more or less gibbous, length and breadth nearly equal, the greatest width anterior to the middle. Dorsal valve often a little wider than long. Ventral valve slightly the more convex, the greatest depth being a little anterior to the umbones : beak extended and slightly incurved, and, in all the specimens examined, truncated by a broad rounded foramen, impressed near the front by a short shallow sinus which produces an arcuation of the dorsal valve in front. Surface marked by close concentric lines of growth, which are crowded into wrinkles on the sides of the shell. Interior substance of the shell fibrous, with an exterior covering which appears to be punctate.

This shell bears many features of TEREBRATULA. It differs from *M. barrisi* in the broader form, short and little defined sinus, and surface characters.

Geological formation and locality. Shales of the Hamilton group, in Western New-York.

MERISTA BARRISI (n.s.).

SHELL ovoid, more or less elongate or sometimes broadly ovate; proportions variable. Ventral valve extremely arcuate : beak incurved; mesial depression sometimes beginning about one-third the length below the beak, and becoming on the front of the shell a broad flattened sinus produced in a short linguiform extension. Dorsal valve little longer than wide, regularly convex, abruptly elevated near the anterior margin from the extension of the mesial sinus of the opposite valve. Surface smooth, or marked by regular concentric lines of growth; some at the margins crowded into wrinkles. The exfoliated shells show obscure radiating striæ.

This species presents considerable variety of form; due, in the specimens examined, both to stages of growth and to accidents of compression, and also to the degree of development of the mesial sinus.

Geological formation and locality. In limestone of the Marcellus shale, near Leroy, N.York. From Rev. W. H. BARRIS.

MERISTA DORIS (n.s.).

SHELL subovate, elongate, compressed below the middle and the margins thin and sharp, gibbous on the umbones. Ventral valve with the beak elongate, attenuate and incurved; the sides below the beak abruptly compressed, making a concave area; regularly convex from the beak to below the middle of the valve, where it

is depressed into a shallow undefined sinus which is produced in front, and in old shells becomes a linguiform extension. Dorsal valve oval, narrowed towards the beak, a little more gibbous on the umbo than the opposite valve, depressed below the middle, and becoming in old shells abruptly bent upwards. Surface marked by close concentric lines of growth, and fine radiating striæ are visible upon the surface in the exfoliated shell, and upon the cast. Shell-structure punctate.

I refer this and the preceding species, with some hesitation, to the Genus Merista. They correspond in general form, and this species has the mesial septum in the dorsal valve, and the two strong dental lamellæ in the ventral valve. I have seen no perfect beaks.

This species is readily distinguished by its greater proportional length and attenuation. Some half-grown shells show no evidence of a sinus, while in other individuals it becomes earlier distinct. One specimen measures an inch and three quarters in length, by an inch and a quarter in width : the usual length is from one and a quarter to one and a half inches, with a width of about one inch.

Geological formation and locality. In loose masses of limestone, south of Young's farm, Williamsville, Erie county.

MERISTELLA MULTICOSTA (n.s).

Shell ovate, subcircular or transverse, moderately gibbous : beak small, pointed, somewhat incurved. Ventral valve with a broad well-defined mesial sinus, reaching nearly to the beak; in elongated specimens, extended in front. Dorsal valve the most convex; mesial elevation most distinct in the upper part of the valve. Surface marked by strong angular plications, generally bifurcating; from six to ten on the mesial elevation, the lateral ones of which have their outer faces broad, forming the entire height of the elevation; the plications on each lateral portion of the shell about six or eight, variable in number. Numerous concentric wrinkles cross the striæ, giving a broken aspect to the surface. Substance of the shell extremely thin.

This species differs from *M. quadricostata* of the upper black shales, in being much larger and more robust. The mesial lobe is always distinctly marked; the plications are strong, angular, and cover the whole shell.

Geological formation and locality. Shales of the Hamilton group, in numerous localities in Western New-York.

The following species, described under the Genera Orthis and Atrypa, belong to the Genus Meristella.

MERISTELLA LIMITARIS.

Orthis limitaris : Vanuxem, Rep. 3d Geol. Dist. New-York, 1843, p. 146, f. 3.
Atrypa limitaris : Hall, Rep. 4th Geol. Dist. New-York, p. 182, f. 11.

Shell moderately gibbous, subcircular or transverse. Dorsal valve with a broad mesial elevation. Ventral valve with sinus only on the anterior portion. Surface covered by numerous fine plications, mostly simple.

When found in limestone, it is full and well formed; but in the thinly laminated shales it is usually compressed, and occurs in great numbers.

Geological formation and locality. In the black shales at the base of the Hamilton group, at Leroy and Avon, N.York.

MERISTELLA QUADRICOSTATA.

Orthis quadricostata : VANUXEM, Report on 3d Geol. Dist. New-York, 1843, p. 168.
Atrypa quadricostata : HALL, Report on 4th Geol. Dist. New-York, p. 223, f. 2.

SHELL thin, flattened, transverse, marked by distinct rounded plications in the middle of the valves; lateral portions plain, or with faintly marked plications; without distinct mesial fold or sinus.

This species is smaller than the preceding, with fewer radiating plications. It differs from *M. multicosta* in the absence of a mesial fold, and smaller number of ribs.

Geological formation and locality. Upper black shales of the Hamilton group: Bigstream point, Seneca county; and other places in Western New-York.

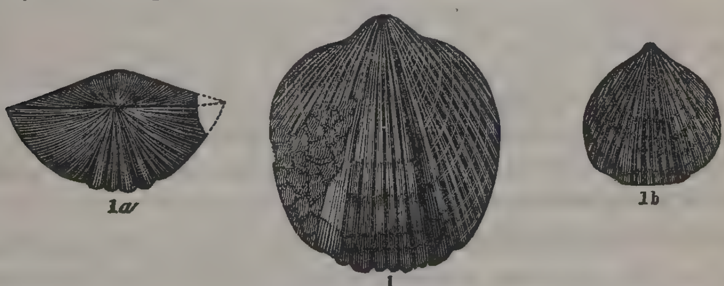
MERISTELLA MESACOSTALIS.

Atrypa mesacostalis : HALL, Report on 4th Geol. Dist. New-York. Illustrations of Fossils of the Chemung group, 64, ff. 1, 1 *a*, 1 *b*.

SHELL somewhat elongated, with moderately prominent beak. Valves convex, with well-defined mesial lobe and sinus, which are covered with plications; those bordering the sinus are the largest. Lateral portions of the shell smooth, or with obscure ribs.

This species is usually larger than any of the preceding, and is characterized by its elongate form and plain or obscurely marked lateral portions of the shell.

Geological formation and locality. In rocks of the Chemung group : Steuben county, and other parts of Western New-York.



MERISTELLA MESACOSTALIS.

FIG. 1, 1 *a*. Ventral and cardinal views of full-grown individuals of *M. mesacostalis*.
FIG. 1 *b*. Ventral view of a young individual of the same species.

NOTE ON THE GENUS CYPRICARDITES.

In the Twelfth Annual Report of the Regents upon the State Cabinet, 1859, I communicated a notice of the Genera Ambonychia, Palæarca and Megambonia; the descriptions of the two last genera having been sometime previously printed in Vol. iii, Pal. N.Y.

At that time, a comparison of specimens led me to refer to the original description and figure of Cypricardites of Conrad; and I appended his description, with an outline figure copied from a plate by that author. I suggested that the genus corresponded in many respects with Palæarca, and I recognized the priority of Cypricardites. In reference to the figure, I wrote as follows :

"This figure is copied from the original figure of Mr. Conrad, accompanying his description of the genus in 1841. The plate upon which this occurs was engraved to accompany the Annual Report of 1841 ; but unfortunately only a small number were ever distributed*, so far as known to the writer. The same plate contains illustrations of the Genera Nuculites, Lyrodesma, Orthonota, Cyrtolites, Orthostoma, Dictyocrinus, Aspidolites and Dicranurus, as well as one species of Platyceras, all genera proposed by Mr. Conrad. At the time I proposed the Genus Palæarca in 1847, I had overlooked the description and figure of Cypricardites ; and it is only since the printing of that part of Vol. iii, Palæontology of New-York, that my attention has been directed to the subject of the preceding note."

In the Canadian Journal of Industry and Science for July 1861, page 354, Mr. Billings proposes to give a history† of the Genus Cyrtodon, and makes the following remarks :

"In the Fifth Annual Report on the Palæontology of New-York, Conrad, in 1841, characterized his genus *Cypricardites*, and described sixteen species from the Silurian and Devonian rocks of the State. He did not give any illustrations, but it now appears that he prepared a figure (showing the character of the hinge) which however remained in Professor Hall's hands eighteen years without publication. In the 8th volume of the Journal of the Academy of Natural Sciences, Conrad described seven other species from the Devonian rocks of New-York. These are all figured.

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* I inferred that only a small number of copies of the plate were published with the Report; but it may have been more extensively distributed than I supposed, for I have found five copies among my own volumes.

† One of the histories of the genus.

"In 1847, Professor Hall suppressed the genus *Cypricardites*, and substituted his own genus *Modiolopsis*, in which he placed all Conrad's Lower Silurian species."

Had these remarks of Mr. BILLINGS concerned myself alone, I would not have noticed them; but as I am charged, in a respectable journal, with suppressing a genus proposed by Mr. CONRAD, and with holding in my hands "for eighteen years without publication" a figure showing the characters of the hinge, I cannot, in justice to Mr. CONRAD and myself, do otherwise than communicate a copy of the lithographic plate to which I originally referred, and which was published with his Report in 1841, and circulated with some but not with all the copies.

I proposed the Genus MODIOLOPSIS, not as a substitute for CYPRICARDITES, but because the species included under that name did not appear to be congeneric; and I separated some of those which did not possess the typical marks of CYPRICARDITES.

With regard to the propriety of adopting the name CYPRICARDITES, on account of a zoölogical error involved, it is scarcely worth while to offer argument. We have too many analogous cases, and that of the Genus ATHYRIS may serve as an illustration. Mr. CONRAD is doubtless entitled to the priority of discovery, description and illustration of the characters of the Genus CYPRICARDITES; and I cannot suppose that another generic term, applied to shells of precisely the same character, will supersede the original name.

In reference to the Genera MEGALOMUS and MEGAMBONIA*, I can have no controversy with Mr. BILLINGS. If naturalists are content to accept his assertions without other evidence, I shall not complain: the typical species will remain, and may, at some future time, be studied without passion or prejudice.

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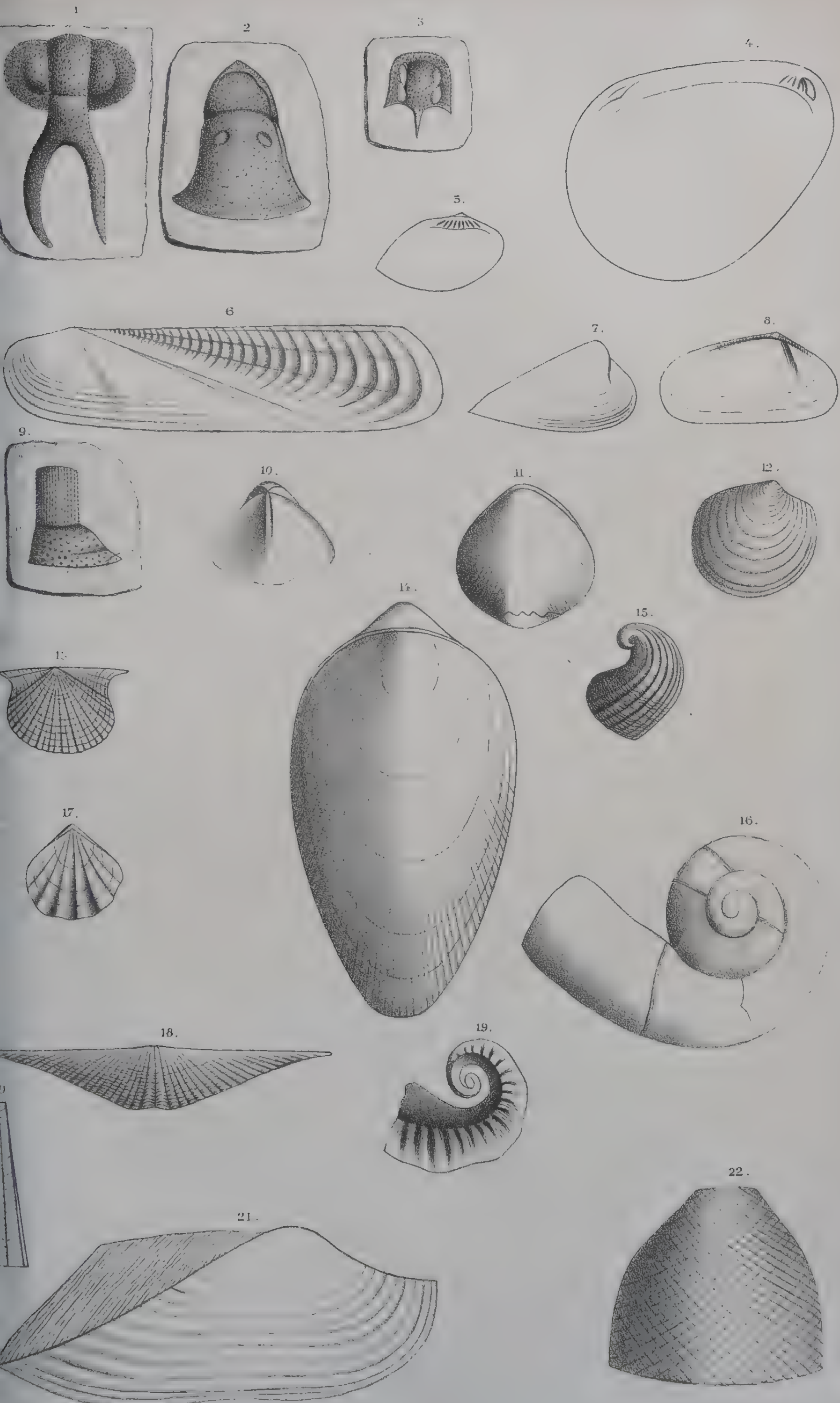
* A small amount of conchological knowledge is sufficient to show that these forms are not only generically distinct, but that they belong to a different *family* of shells from those described as PALÆARCA or CYRTODONTA.

EXPLANATION OF PLATE 11.

Fig. 1. DICRANURUS : Conrad, Annual Report for 1841, p. 48.
Fig. 2. ASPIDOLITES : Conrad, Annual Report 1841, p. 48.
Fig. 3. ACIDASPIS TUBERCULATUS : Conrad, Annual Report 1840, p. 205.
Fig. 4. CYPRICARDITES : Conrad, Annual Report 1841, p. 51.
Fig. 5. LYRODESMA : Conrad, Annual Report 1841, p. 51.
Fig. 6. ORTHONOTA UNDULATA : Conrad, Annual Report 1841, p. 50.
Fig. 7. NUCULITES CUNEIFORMIS : Conrad, Annual Report 1841, p. 50.
Fig. 8. N. OBLONGATUS : Conrad, Annual Report 1841, p. 50.
Fig. 9. ASAPHUS ADSPECTANS : Conrad, Annual Report 1841, p. 49.
Fig. 10. ATRYPA UNISULCATA : Conrad, Annual Report 1841, p. 56.
Fig. 11. ATRYPA PECULIARIS : Conrad, Annual Report 1841, p. 56.
Fig. 12. POSIDONIA LIRATA : Conrad, Annual Report 1838, p. 116.
Fig. 13. AVICULA BELLA : Conrad, Annual Report 1841, p. 54.
Fig. 14. ATRYPA ELONGATA : Conrad, Annual Report 1839, p. 65.
Fig. 15. PLATYCERAS SULCATUS : Conrad, Annual Report 1841, p. 56.
Fig. 16. ORTHOSTOMA COMMUNIS : Conrad, Annual Report 1838, p. 119.
Fig. 17. ATRYPA ACUTIPLICATA : Conrad, Annual Report 1841, p. 54.
Fig. 18. DELTHYRIS MUCRONATA : Conrad, Annual Report 1841, p. 54.
Fig. 19. CYRTOLITES : Conrad, Annual Report 1838, p. 118.
Fig. 20. CONULARIA LAQUEATA : Conrad, Annual Report 1841, p. 57.
Fig. 21. CYPRICARDITES CARINATA : Conrad, Annual Report 1841, p. 53.
Fig. 22. DICTUOCRINITES : Conrad.

PLATE 11.



(Copied from the Original Lithographic Plate of T.A. Conrad, Esq.)

Swinton, lith.

NOTES AND CORRECTIONS.

GENUS PHOLIDOPS.

In the Addenda to Vol. iii, Palæontology of New-York, p. 489, I have noticed and described a new genus under the name Pholidops; expressing some doubt whether it may be a patelliform univalve, or a bivalve shell, since the only specimen where two valves were shown in connexion was not entirely satisfactory.

In the Thirteenth Report upon the State Cabinet, p. 92, I noticed the genus, and described an additional species, expressing my belief that the shell was univalve. The numerous specimens observed in the Hamilton group are all of single valves; and hence I was led to the conclusion, that in the Oriskany sandstone species, showing two similar valves in contact, the relation was only accidental.

During the last year, however, I have found among some collections from the Niagara group in Indiana, another species with two similar valves closely conjoined; thus leaving no longer a doubt regarding the bivalve nature of these fossils. The specimen here referred to, and the *Pholidops terminalis* of the Oriskany sandstone, have both valves entire, and there is no perforation as in Discina. There may have been a foramen or opening between the valves at the apex, for the protrusion of a pedicel. The description therefore requires to be modified.

GENUS PHOLIDOPS (*as emended*).

Shell small, bivalve : valves patelliform; apex anterior, subcentral, excentric or terminal. Surface marked by concentric lamellæ of growth, which are more expanded on the posterior side. Interior of the valves a shallow oval cavity, with a bilobed or horseshoe-shaped muscular impression in one of the valves; the margins flattened or sometimes slightly deflected, and entire.

Shells known in the Niagara and Lower Helderberg groups, Oriskany sandstone and Hamilton group.

GONIATITES PATERSONI (HALL).

Thirteenth Report of the Regents on the State Cabinet, p. 99.

The fragment figured was given to me many years since by a person residing in the neighborhood of the locality, which is in the Hamilton shales; and I could have no reason to doubt the correctness of the position assigned to it.

Recently, however, Prof. WINCHELL has called my attention to a figure of a Goniatite which is evidently specifically identical with *G. patersoni*, the original of which was found in the rocks of the Portage group*. About the same time, Prof. DEWEY, of Rochester, showed me some specimens of the same species, from the south part of Livingston county, which, from the character of the adhering green shale, left no doubt as to the geological formation from which they were derived. It will probably be found that the *G. patersoni* is not a Hamilton fossil, and that the specimen originally described was thus associated through erroneous information.

Fourteenth Report on State Cabinet, p. 91, for *Cyclonema ventricosa*, read *Cyclonema varicosa*. Pages 96, 97 & 98, change the name *Clioderma* to *Pterotheca*.

Thirteenth Report on State Cabinet, p. 113: NOTE *upon the Trilobites of the Hudson-river group in the Town of Georgia, Vermont.*

THIS title was changed in a part of the edition, by substituting the words "Quebec group" for "Hudson-river group", in deference to the views advanced by the Geological Survey of Canada. A note, giving an explanation of the reasons for this change, should have been inserted at the end of the Report.

We now know that the rocks included in the Quebec group are of the same age as those of the Hudson-river group in its typical localities in the Hudson valley, but not identical with the Pulaski and Lorraine shales heretofore united with the Hudson-river group.

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* "At Portage falls, Livingston county, New-York, in shaly sandstone of the Lower Portage."

Twelfth Annual Report of the Regents on the State Cabinet.

The first seventeen pages of the palæontological part of this Report were printed and stereotyped in January and the early part of February, 1859; and nearly one hundred copies were distributed immediately thereafter. The entire report was printed and published previous to the 20th September, 1859; and any person, procuring proofsheets from the printer "*in the beginning of the month of August*", must have obtained the sheets at least as far as page 56, which had been printed in the early part of July. The proofsheets of the Tenth Report were in like manner *procured from the printer*, as fast as issued. Similar practices have been resorted to by interested parties, with respect to other reports; proofsheets having been obtained from the printing-office, many months in advance of publication : and I wish simply to record the fact in this place. I had supposed that authors considered such proceedings disreputable, and I scarcely believe that there can be a difference of opinion among gentlemen in regard to acts of this kind. [See Canadian Journal of Industry and Science, N. S. No. 34, p. 355; and Canadian Naturalist and Geologist, Vol. vi, No. 4, p. 317.]

Fifteenth Report on the State Cabinet.

The woodcuts, arranged in pages in this Report, were originally intended to be inserted in their appropriate places with the descriptions of the species; but a considerable part of the report having been stereotyped and printed last year, it became impossible to accomplish this object.

The palæontological part of the Report, as far as page 112, was published in advance in the months of August and September, 1861. The descriptions of the Crinoidea were published in July 1862, and the entire Report will be published in the first days of October 1862.

JAMES HALL.

THE following is appended to this Report, as the last sheets are passing through the press.

A few weeks since, an interesting collection of teeth and plates of fishes, supposed to be from the Old Red Sandstone of Delaware county, was received at the Geological Rooms. The Curator was directed to visit the locality, for the purpose of enlarging the collection. The following is his report.

ALBANY, SEPTEMBER 20, 1862.

DR. S. B. WOOLWORTH, *Secretary of Regents, &c.*

SIR :

AGREEABLE to your directions, I went to Delaware county, to collect fossils from the Catskill group, or Old Red Sandstone.

At Franklin I found Mr. J. M. WAY, a gentleman who for years has been examining the rock and collecting the fossils; and although he is unacquainted with any other localities, and has never seen a collection of fossils, he has succeeded in investigating the whole strata of the neighborhood and collecting many fossils. With his assistance, I was able to make a section from the Oleout creek to the top of a hill about three miles southwest of the village of Franklin, more than 800 feet in thickness. The base is a brick red shale, with occasional red argillaceous sandstone, about 400 feet. On this is about fifty feet of greenish shale; on which lies a stratum of gray sandstone, with teeth and plates of fishes, and fossils of the *Chemung group*. Seventy feet of green shale lies on this fossiliferous stratum; when another thin band of fossils, with gravel and the same formation, continues with alternate shale and gray sandstone and fossils to the top of the hill, where the Chemung fossils are more numerous. Spirifers, Rhynchonellas, Pectens and Athyres are found in all the strata of the upper three hundred feet, and the whole formation is undoubtedly Chemung.

I examined other localities with the same result.

Mr. WAY has examined the rock as far as Deposite (twenty-five miles southwest), with great care, and finds the same formation. He has also collected the same fossils at Delhi, seventeen miles southwest.

From my investigation, I believe there is no Old Red Sandstone in this State. I found no forms among the fish remains like those of the Old Red Sandstone of Great Britain, but we have plates far larger than those found there.

The Teeth closely resemble those described by Dr. NEWBERRY, from the Corniferous rocks of Ohio and New-York.

Respectfully your obedient servant,

E. JEWETT.

SIXTEENTH ANNUAL REPORT

OF THE

Regents of the University of the State of New-York,

ON THE CONDITION OF THE

STATE CABINET OF NATURAL HISTORY,

AND THE

HISTORICAL AND ANTIQUARIAN COLLECTION ANNEXED THERETO.

Made to the Legislature, April 15, 1863.

ALBANY:
COMSTOCK & CASSIDY, PRINTERS.
1863.

State of New York.

No. 115.

IN SENATE,

April 16, 1863.

SIXTEENTH ANNUAL REPORT

OF THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW-YORK, ON THE CONDITION OF THE STATE CABINET OF NATURAL HISTORY, AND THE HISTORICAL AND ANTIQUARIAN COLLECTION ANNEXED THERETO.

UNIVERSITY OF THE STATE OF NEW-YORK:

Office of the Regents,
Albany, April 15, 1863.

TO THE HON. DAVID R. FLOYD JONES,
Lieutenant-Governor and President of the Senate.

SIR:

I have the honor to transmit the Sixteenth Annual Report of the Regents of the University, on the State Cabinet of Natural History and the Historical and Antiquarian Collection annexed thereto.

I remain, very respectfully,
Your obedient servant,
JOHN V. L. PRUYN,
Chancellor of the University.

REPORT.

To the Legislature of the State of New-York.

The Regents of the University respectfully report :

The collections of the Cabinet continue in the same excellent condition of preservation, as at the date of the last report. Those in zoology, particularly liable to the depredations of insects, have been thoroughly examined, and were found to be entirely uninjured. It has been deemed important, as far as practicable, to procure skeletons, or at least the skulls of the animals represented in the Collection. This work has been commenced, and every opportunity of carrying it forward will be embraced. Among the skeletons already obtained is that of the Moose, an animal which is nearly extinct in this State.

The arrangement of the specimens in palæontology has been completed, and the labelling has been extended as far as the descriptions have been made and the names fixed.

The expectations of considerable additions to the collections in economic geology, from the voluntary contributions of persons engaged in converting rocks and minerals to the uses of life, have not been realized ; and the Regents have become convinced that this object can be accomplished only by the earnest efforts of a person fully comprehending and appreciating what is wanted, and acting on a well-formed and fully developed plan. Such a plan in regard to the size and form of specimens, and their collection, is already formed ; and it is intended vigorously to prosecute it, with the hope and expectation of realizing, to some considerable extent, during the present year, the objects proposed.

The printing of the grammatical and lexicographical treatise on the language of the Mohawks, communicated with the last report, has not been completed, owing to a difficulty of obtaining suitable type for some of the characters. It will be resumed and attached to the present report.

The contributions of Professor Hall to the Palæontology of the State are continued, and herewith submitted.

A list of contributions and collections made by the Curator is annexed.

Respectfully submitted,

By order of the Regents.

JOHN V. L. PRUYN,

Chancellor of the University.

Albany, April, 1863.

ACCOUNT CURRENT.

THE Secretary of the Regents of the University, in account current with the appropriation for preserving and increasing the State Cabinet of Natural History,

DR.

1862–63.	To balance to new account (See Senate Document No. 116, 1862, p. 9)	$710 96
	To amount received from the Comptroller, on account of the appropriation for 1861–62	400 00
	To interest on bank deposit to January 1862	18 94
		$1129 90

CR.

1861–62.	By cash paid an assistant	$46 88
	.. specimens of natural history	83 75
	.. books	12 00
	.. freight	4 58
	.. postage and stationery	31 25
	.. chemicals	48 93
	.. contingent expenses	44 60
	[*Vouchers Nos.* 1 – 6.]	$271 99
	By balance	857 91
		$1129 90

IN BEHALF of the Standing Committee on the State Cabinet, I have examined the above account, and find it correct. The payments have been made by order of the Standing Committee, and are accompanied with proper vouchers. J. N. CAMPBELL.

ALBANY, April 14, 1863.

CONTENTS OF THE APPENDIX.

APPENDIX.

(A.)

DONATIONS TO THE STATE CABINET DURING 1862.

From S. S. WHITMAN, Littlefalls, N.Y.

Two specimens of SANDSTONE from the Calciferous sandrock.

Four specimens of ANTHRACITE COAL, one with crystals of quartz, from the Calciferous sandrock.

Dr. J. H. SALISBURY, Newark, Ohio.

Part of a TREE petrified; ANTHRACITE and CHERT from the Coal measures near Falmouth, Ohio.

Mr. HOWE, of Schoharie county, N.Y.

Two large STALACTITES, from Howe's Cave.

C. V. R. HORTON, Chaumont, Jefferson county, N.Y.

Six STONE ARROWHEADS, and a STONE CHISEL.

Lieut. FISK, 66th Regiment New-York Volunteers.

A FLINT ARROWHEAD from the Battle-field of Malvern Hill.

PETER TEN EYCK.

A large COPPERHEAD SNAKE.

CHARLES H. PECK, Albany.

Fifty species of MOSSES, collected in the vicinity of Albany.

GEORGE T. HALL, Normal School.

Specimens of INDURATED CLAY, from Ballston, Saratoga county, N.Y.

E. JEWETT.

Three EURYPTERUS REMIPES; and a slab of beautiful CRINOIDS, seven in number.

HENRY A. HOMES.

FOSSILS from the Hamilton group.

FOSSILS from the Pleistocene formation, Brandon, Vermont.

GEORGE E. GRAVES, Albany.

LIZARDS, FISHES and INSECTS in alcohol, from South America.

JOSEPH HENRY, LL.D., Washington.

Catalogue of North-American BIRDS, by S. F. BAIRD.
Classification of the COLEOPTERA of North America, by J. L. LECONTE.
The COLEOPTERA of Kansas and Eastern New-Mexico, by J.L.LECONTE.
Synopsis of the NEUROPTERA of North America, by HERMANN HUGEN.
Synopsis of the LEPIDOPTERA of North America, by JOHN G. MORRIS.
Monograph of the DIPTERA of North America, by H.
Catalogue of the described DIPTERA of N. America, by R. OSTEN SACKEN.
A box of TERTIARY FOSSILS.

Dr. E. W. HUBBARD, Taltonville, Staten island.

Three species of SERPENTS.
Six species of CRUSTACEANS.
Four species of FISHES. COLEOPTEROUS INSECTS.
Three species of SALAMANDERS.
Two species of STAR-FISHES.
Two specimens of PHRYNOSOME ORBICULARIS (Horned frogs), Texas.
Specimen of SCARABÆUS HERCULES, from South America.

HENRY RADCLIFF, Albany.

A collection of ESQUIMAUX DRESSES, etc.

Jumper, or Coat for male.
Pants and Boots for male.
Jumper, or Coat for female.
Pants and Boots for female.
Spear for killing Bear.
Spear for killing Walrus and Seal.
Lance, Harpoon-line, Dog-trace, Whip-lash, Lamp, Lamp-wick, Matches, Knife, Sleigh equipments.

(B.)

COLLECTED BY THE CURATOR.

From the Chemung group [Catskill of the Reports], Franklin, Delaware county.

TEETH and PLATES of several species of FISHES. Also MOLLUSKS and PLANTS.

Three specimens of EURYPTERUS REMIPES.

A Slab of MARIACRINUS PACHYDACTYLUS, seven in number.
Jerusalem Hill, Herkimer county.

(C.)

A LIST OF THE BIRDS OF NEW-YORK,

Noticed in Maine during June 1862.

BY HENRY A. DANKER.

AQUILA CHRYSÆTOS,	Golden Eagle.
HALIÆTOS LEUCOCEPHALUS,	Bald Eagle.
PANDION CAROLINENSIS,	Fish Hawk.
ASTUR COOPERI,	Cooper's Hawk.
CHORDEILES AMERICANUS,	Nighthawk.
CHÆTURA PELASGIA,	Chimney Swallow.
HIRUNDO PURPUREA,	Martin.

Hirundo bicolor,	Whitebellied Swallow.
Hirundo riparia,	Bank Swallow.
Hirundo rufa,	Barn Swallow.
Hirundo lunifrons,	Cliff Swallow.
Alcedo alcyon,	Belted Kingfisher.
Trochilus colubris,	Hummingbird.
Sitta carolinensis,	Whitebreasted Nuthatch.
Troglodytes hyemalis,	Winter Wren.
Parus atricapillus,	Chicadee.
Sialia wilsoni,	Bluebird.
Turdus migratorius,	Robin.
Turdus mustelinus,	Wood Thrush.
Turdus solitarius,	Hermit Thrush.
Turdus wilsoni,	Wilson's Thrush.
Seiurus aurocapillus,	Oven-bird.
Trichas marilandica,	Yellow Thrush.
Vermivora peregrina,	Tennessee Warbler.
Vermivora rubricapilla,	Nashville Warbler.
Sylvicola coronata,	Myrtle-bird.
Sylvicola maculosa,	Spotted Warbler.
Sylvicola pardalina,	Canada Flycatcher.
Sylvicola canadensis,	Blackthroated Warbler.
Sylvicola icterocephalus,	Chestnutsided Warbler.
Muscicapa ruticilla,	Redstart.
Muscicapa pusilla,	Least Flycatcher.
Muscicapa fusca,	Phœbe-bird.
Tyrannus intrepidus,	Kingbird.
Tyrannus cooperi,	Olivesided Kingbird.
Vireo gilvus,	Warbling Vireo.
Vireo olivaceus,	Redeyed Vireo.
Garrulus cristatus,	Blue Jay.
Garrulus canadensis,	Whiskey-jack, Canada Jay.
Corvus americanus,	Crow.
Quiscalus versicolor,	Blackbird.
Quiscalus ferrugineus,	Rusty Grakle.
Struthus hyemalis,	Common Snowbird.
Fringilla melodia,	Song Sparrow.
Fringilla pennsylvanica,	Whitethroated Finch.
Fringilla leucophrys,	Whitecrowned Finch.
Emberiza socialis,	Chipping Sparrow.
Ammodramus palustris,	Swamp Finch.
Carduelis tristis,	Yellowbird.
Picus pileatus,	Crested Woodpecker.
Picus villosus,	Hairy Woodpecker.
Picus pubescens,	Downy Woodpecker.
Picus varius,	Yellowbellied Woodpecker.
Tetrao umbellus,	Ruffed Grouse.
Tetrao canadensis,	Spruce Grouse.
Totanus macularius,	Sandlark.
Larus zonorhyncus,	American Gull.
Mergus serrator,	Redbreasted Sheldrake.
Anas obscura,	Black Duck.
Anas sponsa,	Wood Duck.

SIXTEENTH ANNUAL REPORT

OF THE

Regents of the University of the State of New-York,

ON THE CONDITION OF THE

STATE CABINET OF NATURAL HISTORY,

AND THE ANTIQUARIAN AND HISTORICAL COLLECTION ANNEXED THERETO.

APPENDIX D.

Made to the Legislature April 15, 1863.

ALBANY:
COMSTOCK & CASSIDY, PRINTERS.
1863.

⁂ Several plates of illustrations of Crinoidea and other fossils, previeusly described, which were communicated with this Report, have been omitted, from the impossibility of getting them lithographed in proper time. A supplementary note on some fossils of the Potsdam sandstone (pages 221 & 222) has been added, and the illustrations included on Plate V A.

(D.)

CONTRIBUTIONS TO PALÆONTOLOGY;

PRINCIPALLY FROM

INVESTIGATIONS MADE DURING THE YEARS 1861 & 1862.

BY JAMES HALL.

*** May, 1863. The species under quotation marks are selected from, and published in anticipation of, the fourth volume of the Palæontology of New-York, for which volume they were put in type during the interval between the first day of October and the last day of November 1862.

1. DESCRIPTIONS OF NEW SPECIES OF BRACHIOPODA,

FROM THE UPPER HELDERBERG, HAMILTON AND CHEMUNG GROUPS.

GENUS LINGULA (Bruguiere).

"LINGULA CÈRYX (n. s.)."

A single specimen has been obtained, three-fourths of an inch in length by half an inch in breadth. Very little of the shell is preserved; merely sufficient to show that it was marked by fine concentric striæ, with the cardinal margin thickened. The cast has a distinct oval impression a little above the centre, showing the mark of a muscular callosity at that point.

This species resembles in form the *L. densa* of the Hamilton group, but has not the strong radiating striæ of that species, while the subcentral muscular callosity is also different.

Except that this is the only representative of the genus known to me in the Schoharie grit, I would not have thought it worth while to designate the species from a single imperfect specimen.

Geological formation and locality. In the Schoharie grit: near Clarksville, Albany county.

"LINGULA DESIDERATA (n. s.)."

Shell robust, elliptical, convex, the width equal to about four-sevenths of the length, the greatest width being above the middle of the shell.

Surface marked by fine and closely arranged concentric striæ; the interior of the shell, and the cast, showing strong radiating striæ. Length a little less than half an inch.

The specimen is apparently a dorsal valve, which is truncate, and perhaps a little imperfect at the beak. In its general form it resembles *L. ligea*, but is wider above the centre and more convex, while it is larger than any specimens of that species in the collection. The presence of radiating striæ has not been observed in *L. ligea*. Other specimens are required for a satisfactory determination of its character.

Geological formation and locality. In the Corniferous limestone of the Upper Helderberg group, at Lapham's mill, Ontario county.

"LINGULA MANNI (n. s.)."

SHELL somewhat obovate, the cardinal end being narrower and rounded; gradually expanding in width for more than two-thirds the length, becoming slightly narrower below, with the baso-lateral angles very abruptly rounded: basal margin nearly straight. Surface marked by fine close concentric striæ, which are scarcely elevated above the smooth glossy surface. Shell thin: valves nearly flat.

One specimen measures three-fourths of an inch in length by half an inch in its greatest width, while the width one-third the length below the posterior end is three-eighths of an inch.

Two separate valves are all that have been seen of this species, but it differs sufficiently from all the others in these strata to be readily recognized. This and one other are the only species of LINGULA, at this time known to me, in the limestones of the Upper Helderberg group.

The specimens were received from Dr. R. P. MANN, of Milford, Delaware county, Ohio.

Geological formation and locality. In limestone of the age of the Upper Helderberg limestone, in Delaware county, Ohio.

"LINGULA LEANA (n. s.)."

SHELL robust, ovate, subattenuate towards the beak; margins gradually expanding and curving from the beak for about two-thirds the length, where the shell has its greatest width. Lower half of the shell very depressed-convex, becoming more convex towards the beak. Shell comparatively thick, lamellose.

SURFACE marked by fine concentric striæ and faint interrupted radiating striæ, which are more conspicuous and continuous in the exfoliated shell. The length of an apparently full-grown individual is eight-tenths of an inch, and the greatest width eleven-twentieths of an inch.

This species is conspicuously distinct from any others in the Hamilton and Chemung groups, except *L. palæformis*, from which it differs in its greater proportional length and more attenuate form towards the beak. So far as known to me, it is a rare species.

Geological formation and locality. In some calcareous layers in the Hamilton shales, in Bristol, Ontario county.

"LINGULA MAIDA (n. s.)."

SHELL linguiform, elliptical, greatest width a little more than half the length, narrowing gently towards either extremity,

obtusely rounded and produced below, and more acutely converging towards the beaks.

SURFACE very gently convex below and a little more convex on the umbo, marked by fine threadlike striæ which are sometimes crowded in fascicles. No radiating striæ are preserved in the specimen.

The specimen described is apparently a ventral valve, and preserves some remains of the muscular impression. In form it resembles the *L. ligea*, but is less convex, and the lower part of the shell is more produced, so that the striæ make a more extended curve than on that species, and they are likewise coarser.

The typical forms of *L. ligea* are about half an inch in length and one quarter of an inch in width; and the *L. maida* has a length of more than three-fourths of an inch, with a width of nearly half an inch.

Geological formation and locality. In the Moscow shales of the Hamilton group: at Moscow, Livingston county.

"LINGULA PUNCTATA (n. s.)."

SHELL subelliptical, length and breadth as three to two; sides parallel; base subtruncate; cardinal slopes abrupt, and but little curved; umbones prominent, somewhat flattened in the middle below the longitudinal centre, the flattened space expanding towards the base. Ventral valve a little more convex than the opposite.

SURFACE marked by concentric wrinkles; the entire structure punctate or subpunctate, sometimes corrugate, with extremely fine striæ. Muscular impressions, in the cast or partially exfoliated shell, subcordate below, with numerous diverging foliate imprints above.

The length of the shell varies in different individuals from one-half to three-fourths or even seven-eighths of an inch, and the width of the larger specimens is half an inch. The surface marking is peculiar and characteristic, the apparent punctate structure being caused by two sets of concentric or irregularly wrinkled striæ, leaving minute pits between them. In this character, which is preserved more or less even upon the casts or exfoliated surfaces, the species is readily identified.

It resembles in general form the *L. rectilateris* of the Lower Helderberg group, but is less rounded on the cardinal slopes and less convex on the lower half of the shell, while the base is much more abruptly truncate.

Geological formation and locality. In the shales of the Hamilton group: Monteith's point, on Canandaigua lake.

"LINGULA NUDA (n. s.)."

Shell subelliptical; length nearly twice as great as the width; sides subparallel, very slightly curving, the greatest width near the centre; base truncated; cardinal slopes rounded, the ventral valve a little more pointed and more convex than the dorsal valve. Dorsal valve nearly flat. Ventral valve, in exfoliated specimens, marked by a depressed line down the centre, with indications of foliate muscular impressions upon each side.

Surface marked by fine concentric striæ, which, on the margins, are crowded and wrinkled.

This shell resembles *L. punctata* in form, but is proportionally narrower: it is truncate in front in the same manner; the umbo is a little narrower, and it has not the flattened space below the middle so distinctly indicated. The surface marking, however, is always a more distinctive character. The largest specimen examined, little exceeds half an inch in length.

Geological formation and locality. In the shales of the Hamilton group, associated with *L. punctata*: near Monteith's point, on Canandaigua lake.

"LINGULA DENSA (n. s.)."

Shell subelliptical; sides almost exactly parallel for more than half the length of the shell, abruptly curved at the basal angles, and the base nearly straight or slightly curving; cardinal margins gently curving. Middle and upper part of the shell prominent and rounded; one valve (ventral?) showing a slight longitudinal depression when exfoliated, with fine wrinkled muscular impressions. Valves somewhat abruptly flattened and compressed below the middle.

Shell comparatively thick, compact, and very closely and finely striated concentrically with undulating striæ, the exfoliated shells showing radiating striæ.

This species has nearly the same form as *L. punctata*, but is more robust and more abruptly elevated along the middle of the upper half of the valve: the flattening is only near the lower extremity, and does not extend upwards in a triangular form as in that species. The absence of puncta, and the close scarcely elevated fine striæ, are distinguishing features.

Geological formation and locality. In the upper part of the Hamilton group, near Summit, Schoharie county; occurring in large numbers in some semi-arenaceous layers on the small stream flowing in a gorge known as "Bear Gulf."

"LINGULA DELIA (n. s.)."

Shell elliptical, twice as long as wide; sides gently curving; base

very regularly rounded; cardinal slopes abrupt, nearly straight: substance of shell very thin.

SURFACE marked by extremely fine concentric striæ, and, below the centre of the shell, by numerous undulations, which are stronger on the middle and become obsolete on the sides.

In the ventral? valves, a strongly impressed linear indentation marks the centre of the shell from near the beak more than halfway to the base. This feature is observed in the best specimens seen, as well as in partial casts. An apparently adult specimen measures nine-tenths of an inch in length, and five-tenths in the greatest breadth.

This species differs conspicuously from all others of the Hamilton and Chemung groups, except the *L. maida*, which is proportionally shorter, with more attenuate cardinal extremity and stronger surface striæ.

In general form, this species bears some resemblance to *Lingula ovata* of M'COY (British Palæozoic Fossils, Pl. 1 L, f. 6), having the same slender form; but the sides are not so straight, and the front is more curved. It has not, however, the robust form of that species as represented in figure 1, Plate III, of the Synopsis of the Palæozoic Fossils of Ireland.

Geological formation and locality. In the shales of the upper part of the Hamilton group, near Canandaigua lake.

"LINGULA ALVEATA (n. s.)."

SHELL subelliptical; sides curving, broader below the middle, somewhat abruptly expanding and curving from the beak for more than one-third the length of the shell.

Two separate valves examined (one of them a cast), are flat, and have a somewhat elevated or thickened border, extending from the beak, within which is a distinct groove nearly parallel with the margin and reaching half the length of the shell: the centre is marked by a longitudinal linear impression for more than half its length; and the cast of one specimen preserves the mark of a thin septum, which extends from just beneath the beak three-fourths the length of the shell.

One specimen is nearly an inch and a half long, and the other one inch and one-eighth. The thickened border and thin median septum are distinguishing features.

There are some peculiarities in these specimens, which lead one to suppose that a full knowledge of their characters and interior structure may authorise their separation from the ordinary forms of LINGULA.

Geological formation and locality. In the shales of the Hamilton group, Ludlowville, Cayuga county; and in a sandstone near Fultonham, Schoharie county.

"LINGULA MELIE (n. s.)."

SHELL elliptical; length and breadth about as three to two, the width often a little greater; moderately convex, the umbo prominent, and below it begins a narrow flattened space, which, very gradually widening, reaches to the base (this feature is noticed on the ventral valves). Sides curving, the margins flattened or a little recurved. Beak of the ventral valve extended and acute; and in partially exfoliated specimens there is a depressed sublinear area reaching more than one-third the length of the shell, and margined on each side by a sharp line.

The specimens, which appear to be the ventral valves of the same species, are obtuse at the cardinal extremity, and proportionally wider towards the base. The most extreme example of this kind is shown in fig. 3, while 4 is the extreme of the other form.

The surface characters are the same in all the specimens, and, on the exterior shell, consist of fine concentric striæ which are crowded at intervals into ridges, giving an undulating surface. On the exfoliated fossil, the concentric wrinkles are preserved with faint impressions of the striæ; and obscure radiating coarser striæ mark the surface, becoming stronger towards the margins, and terminating just within the edge in minute depressions or puncta.

This species, in some of its forms, resembles the *L. spatulata*, but is larger, and also very distinct in the details of its surface markings.

This species occurs at Chagrin falls, Ohio, in strata of the age of the Chemung group.

"LINGULA CUYAHOGA (n. s.)."

SHELL subelliptical; length and breadth about as five to three; sides nearly parallel, narrowing a little towards the cardinal margins; beak obtuse; cardinal slopes very little inclined; base abruptly rounded.

SURFACE marked by fine concentric striæ, and, on the exfoliated surface, by fine obscure radiating striæ.

A single valve (ventral?) is very convex along the middle for two-thirds of the length; the front rather depressed, and the entire margin, from the cardinal extremities, flattened. This specimen is in sandstone. Another imperfect specimen in soft shale has nearly the same proportions, but is flattened, and the cardinal slopes less nearly rectangular to the axis.

This species is a well-marked and very distinct form, occurring in the thin arenaceous layers at Cuyahoga falls, and in the green shale at Akron, Ohio, in strata referred to the upper part of the Chemung group of New-York, or Waverly sandstone of Ohio.

GENUS DISCINA (Lamarck).

"DISCINA HUMILIS (n. s.)."

Shell of medium size, circular or subcircular, very depressed-convex on the dorsal side; apex subcentral. Ventral valve flat, with apex subcentral; foramen apparently submarginal.

Surface, from the apex halfway to the margin, marked by fine concentric striæ, and outside of this by a few comparatively distant sharp elevated striæ, with the intermediate spaces scarcely perceptibly striate.

Two specimens only of this species have been recognized: the larger of these has a diameter of more than an inch; and the smaller one, about three-fourths of an inch. They are more nearly circular than any other species in the Marcellus shale and Hamilton group, except the *D. minuta.* The *D. lodensis* is sometimes circular; but its prevailing form is broad-oval, and it is always closely and finely striated, and, in this feature, very distinct from the present species.

Geological formation and locality. In the Marcellus slate, near Bridgwater; and in the shales of the Hamilton group, on Canandaigua lake.

"DISCINA RANDALLI (n. s.)."

Ventral valve circular or nearly circular, gently concave within the margin: foramen large, marked by a broadly oval depression on the exterior surface, which reaches half the distance from the apex to the margin.

Surface marked by strong rounded concentric ridges with sharp depressions between, and sometimes with finer concentric striæ upon the coarser ones; all of them crossed, on the posterior margin of the shell, by fine radiating striæ or vascular impressions, which enter into the substance of the shell. On the anterior half of the shell the concentric striæ become partially obsolete, and, from a constricted ridge which externally marks the place of a median septum in the muscular impression, diverge strong rounded radiating ridges, separated by narrow abrupt depressions which extend nearly or quite to the margin of the valve.

The single specimen known is a partially exfoliated exterior surface of a ventral valve : the margin of the anterior portion is somewhat broken and worn away. Certain appearances indicate that the dorsal lies beneath this ventral valve, imbedded in the matrix, and the two pressed closely together.

This species is a large and remarkable form ; the transverse diameter is nearly three inches, and from the apex to the posterior margin is one inch and a half. The anterior side being broken off, we infer, from the ordinary proportions of these shells, that it has been at least as long as the posterior part, which gives a longitudinal diameter of three inches. The concentric striæ are stronger than in any of the other species in these rocks, and the strong radiating ridges are a very distinguishing feature.

This is the largest well-authenticated DISCINA that I know ; though I have a discoid fossil under consideration, possessing the general appearance of DISCINA, and which in its greatest diameter is four inches.

Geological formation and locality. In the arenaceous shales of the Hamilton group : near Schoharie.

"DISCINA DORIA (n. s.)."

SHELL subcircular or oblate, the transverse diameter usually the greater. Dorsal valve convex; apex elevated, subterminal. Ventral valve flat or concave, the apex excentric; foramen comparatively large, oval, with margins depressed. Shell thin.
SURFACE marked by fine concentric striæ, and the cast by folds or wrinkles in the same direction.

This species closely resembles the *D. newberryi*, from Cuyahoga falls, Ohio ; but that shell is somewhat thicker and stronger, with the apex of the dorsal valve more elevated. The specimens of the present species observed are likewise smaller. The presence or absence of the radiating striæ on the cast, which are probably caused by the soft parts of the animal, cannot be relied upon as characteristic. The length of the largest specimen is about three-tenths of an inch, with a width of seven-twentieths of an inch.

The most characteristic specimens of this species which have been seen, are adhering to other fossils ; and its identity with DISCINA might be questioned, but for the preservation of four individuals (one of them a ventral valve) upon a specimen of *Pleurotomaria sulcomarginata*. The same species occurs in Canada West, attached to SPIRIFER.

Geological formation and locality. In the Hamilton group : at Hamilton, Madison county ; on the east shore of Seneca lake ; and in Canada West.

"DISCINA SENECA (n. s.)."

DORSAL valve broadly oval ; apex about one-third from the posterior margin, and, in a specimen six-tenths of an inch in length, is elevated one-tenth of an inch above the plane of the margins.

Surface marked by concentric, somewhat regular folds or wrinkles in the larger specimens, and, in a smaller one, the surface is similar, but less uneven; the concentric markings being more like undulations of the surface, than the ordinary striæ of Discina.

Two specimens of dorsal valves only have been seen: they have the same form as *D. media* and *D. lodensis;* but the apex is much more elevated, and the surface striæ are not of the same fine and regular character, though, the specimens being partial casts, this feature may be somewhat obliterated. One of the specimens has a length of six-tenths of an inch, with a width of five-tenths; while the smaller one has a length of one-fifth, and a width of one-sixth of an inch.

These specimens occur in the same shale with the other species, which are always flattened, while both the old and young of this maintain their proportions as described. With the single larger specimen, I hesitated to characterize the species; but finding a small one of the same form and character, I can scarcely indicate it as a variety of either of the other species which it resembles in general form.

Geological formation and locality. In the upper part of the Hamilton group: on the east shore of Seneca lake.

"DISCINA MEDIA (n. s.)."

Compare *Discina lodensis.*

Shell broadly elliptical or subcircular, variable in form. Dorsal valve very depressed-convex; apex excentric, pointed, and inclined towards the posterior border. Ventral valve flat, or a little convex just anterior to the foramen; foramen narrow, diretly in the longitudinal axis of the shell, or often a little oblique.

Surface finely and evenly striated by the regular elevated striæ, distant from each other more than twice their width. The apex of the dorsal valve is about one-third, and sometimes less than one-third the length of the shell from the posterior margin. Perforation of the ventral valve narrowly oval or sublinear, about one-third the length of the shell from the posterior margin, and extending towards the edge of the shell.

This species resembles in form the *D. lodensis* of the Genesee slate; but it is more coarsely and distantly striated, and does not present the radiating folds or undulations observed in that species. The position and relations of the apex and foramen are similar, to those of the *D. lodensis;* and it is possible that conditions of the sediment, and other physical causes, may have affected the external characters, and that we have only a well-marked variety of that species. The species is not uncommon in the Hamilton group,

both in the bluish shales and in the dark slaty beds, which are of the same character as the Genesee slate.

A single specimen of a ventral valve, found in the upper part of the Chemung group in Steuben county, possesses characters so entirely similar to those of the Hamilton group, that I can find no means of separating it.

The oval form and excentric position of the apex are sufficient to distinguish the species from others of these groups. The elliptical specimens measure half an inch, or usually a little more in length, with a width of nine-twentieths of an inch.

Geological formation and locality. In the Hamilton group, on the shores of Seneca lake near Ovid, and in the upper part of the group on the shores of the Canandaigua lake; and in the green shale of the Chemung group in the south part of Steuben county, at Troupsburgh.

"DISCINA (sp.?)."

A small nearly circular specimen of a ventral valve, occurring in the Marcellus slate, is marked by fine crowded and scarcely distinct striæ: the apex is excentric, being scarcely more than one-third the length of the shell from the posterior margin; with a short, narrowly oval foramen.

This specimen is unlike any other one before me, and may be a distinct species; but I hesitate to designate it without more material.

Geological formation and locality. In the Marcellus slate: near Bridgwater, Oneida county.

"DISCINA TULLIA (n. s.)."

Dorsal valve elliptical; apex excentric, elevated above the plane of the margins of the shell nearly one inch; length half an inch, and breadth little more than three-tenths of an inch.

Surface marked by fine crowded striæ.

A single specimen of the dorsal valve only has been seen, but its proportions of length and height distinguish it from any other species in the rocks of New-York.

Geological formation and locality. In the Tully limestone near Ovid, Seneca county.

"DISCINA TRUNCATA (n. s.)."

Shell ovate, the anterior end broader: valves depressed-convex. Dorsal valve with the apex near the posterior margin, and directed backwards; posterior margin very abruptly rounded or truncate. Ventral valve with the apex submarginal; foramen extending nearly or quite to the posterior margin, which is indented.

SURFACE marked by fine concentric striæ and faint radiating undefined lines.

This little species scarcely ever exceeds two-tenths of an inch in length; while the greatest breadth, which is anterior to the middle, is nearly the same. The dorsal valve has the appearance of a LINGULA, with flattened margin extending beyond the beak: the ventral valve shows a submarginal foramen. The muscular impressions (which are faintly preserved) differ from the ordinary DISCINA, but are too obscure to afford means of separating it from the genus.

In some specimens the posterior margin is abrutly rounded, while in others it is straightly truncate. It may, perhaps, have been an elongated form of this shell which is figured as *Lingula concentrica* in the Geological Report on the Fourth District.

Geological formation and locality. In the Genesee slate: near Lodi, and at Bigstream point, Seneca county.

"DISCINA NEGLECTA (n. s.)."

SHELL elliptical. Dorsal valve convex: elevation of the apex above the plane of the margins about one-twelfth of an inch; apex situated about one-third the length of the shell from the posterior margin.

SURFACE marked by crowded wrinkled concentric striæ.

A single specimen of the impression of the dorsal valve measures seven-tenths of an inch in length, with a width of six-tenths of an inch. The dorsal valve of another specimen of similar character is more nearly circular, the concentric striæ are thin and elevated, and the interior shows a linear muscular impression.

Other specimens are required for a full determination of the characters of the species. It is a more robust form, with the apex more elevated, than the *D. lodensis*; and the specimens may be compared with *D. seneca.*

Geological formation and locality. In the arenaceous shales of the Chemung group, from the Inclined plane at Ithaca, Tompkins county.

"DISCINA ELMIRA (n. s.)."

DORSAL valve very convex, transversely broad-oval; breadth about seven-tenths of an inch, and length half an inch: apex excentric, or about one-third from the posterior margin. Ventral valve unknown.

SURFACE marked by extremely fine crowded striæ.

This specimen of the dorsal valve only, is noticed in anticipation of obtaining materials for a full illustration. In the elevated dorsal valve, position of apex, and fine striæ, it bears some resemblance to the dorsal valve of *D. grandis.*

Another specimen of similar character, but with the apex a little more depressed, has a length of half an inch, with a transverse diameter of about one inch. This specimen is essentially a cast in sandstone, and its surface markings are not clearly preserved; but it shows no important difference from the preceding one, and for the present I unite the two under the same designation.

Geological formation and locality. In the shales of the Chemung group: near Elmira, Chemung county; and in sandstone of the same group near Wellsborough, Pennsylvania.

"DISCINA NEWBERRYI (n. s.)."

SHELL subcircular or broadly ovate, sometimes oblate: apex situated near the posterior margin or less than one-fourth the length of the shell therefrom, prominent, being from less than one-eighth to one-quarter of an inch above the plane of the margins. Ventral valve slightly concave; apex excentric; foramen large, oval, with the margins deeply depressed. Shell comparatively thick and strong.

SURFACE marked by fine concentric lines, which are very faint in young shells, but become stronger and rise into distinct sharply elevated striæ in older specimens.

Where partially exfoliated, the shell shows intermediate fine radiating striæ; and in older specimens, the interior of the shell, and likewise the cast, is marked by strong radiating vascular impressions. The structure of the shell is strongly lamellose. The casts of the dorsal valve show a narrow longitudinal muscular impression on the anterior side of the beaks. The length varies from one-eighth to one inch.

For these specimens, I am indebted to Dr. J. S. NEWBERRY.

Geological formation and locality. Abundant in a ferruginous band about 110 feet below the Conglomerate at Cuyahoga falls, and in the green shale and shaly sandstone at Akron, Ohio.

GENUS CRANIA (RETZIUS).

"CRANIA AURORA (n. s.)."

A cast of TROCHOCERAS, from the Schoharie grit, preserves the impressions of two individuals of a species of CRANIA, which were apparently adhering to the interior of the shell of the outer chamber of this cephalopod.

VENTRAL valve subquadrate, approaching a circular form; lateral margins slightly curved, and the two extremities abruptly

rounded, the posterior one least curved : margins thickened. The impressions of the anterior muscles are nearly united in a transversely subelliptical scar : posterior adductor scars distant, not well defined in the specimens.

No other species of this or any other species of the genus are known to me at this time, from the Upper Helderberg group.

Geological formation and locality. In the Schoharie grit, in the town of Knox, Albany county.

"CRANIA GREGARIA (n. s.)."

Shell small, obliquely very depressed-conical, subcircular or oblate, narrower at the posterior end ; apex at the posterior third of the shell.

Surface apparently smooth.

This small species occurs from the size of a pin's head, to those having a transverse diameter of a little more than a tenth of an inch, with a longitudinal diameter a little less than one-tenth of an inch. On a single valve of a large bivalve shell, nearly forty individuals of this species can be seen, together with the remains of several ventral valves of one of the larger species.

It may be possible that these small fossils are the young of *C. hamiltoniæ*, which have commenced their existence upon the same body which sustained the parent shells.

Geological formation and locality. In the shales of the Hamilton group, in Bristol, Ontario county.

GENUS PHOLIDOPS (Hall).

"PHOLIDOPS AREOLATA (n. s.)."

Shell broadly subovate or scarcely circular, wider on the posterior third, broadly rounded behind and more narrowly rounded in front.

The cast of one valve (the dorsal valve?) shows a deep ovate or subcordiform muscular scar, which is nearly surrounded by an elevated areola, and partially divided by a median ridge from above. The opposite (ventral?) valve has a larger muscular scar, which is auriculate above, with the surrounding areola divided at the lower or anterior margin. Surface somewhat abruptly flattened on the posterior side, and more gently sloping on the front of the valve.

One specimen has a length a little less than one-fourth of an inch, with a width across the middle nearly the same. The only specimens known in the Schoharie grit are casts, and we have not therefore seen the exterior of the shell. In casts of two in-

dividuals, the muscular impressions present some differences in form, and in the depth of the impressions of the parts, probably indicating the characters of dorsal and ventral valves.

This species closely resembles one in the Oriskany sandstone, from which it differs in being more ovate, as well as in the form and divisions of the muscular scar, and more depressed posterior side.

Geological formation and locality. In Schoharie grit : at Clarksville and Knox, Albany county.

GENUS ORTHIS (Dalman).

" ORTHIS PELORIS (n. s.)."

Shell plano-convex ; the dorsal valve nearly flat, and subcircular or slightly transverse : ventral valve somewhat elliptical, very convex on the umbo, the middle regularly convex and sloping to the front and sides ; cardinal line equal to or greater than two-thirds the greatest width of the shell. Area of moderate height, the beak of the ventral valve extending little beyond the area line.

Surface marked by fine somewhat evenly bifurcating striæ, which curve towards the margins, and a few terminate on the area line of the ventral valve.

The specimens are casts of the interior, with impressions of the exterior : from these latter, casts have been taken, which have served for the description of the exterior surface of the shell.

The internal cast of the ventral valve is highly convex ; the greatest convexity being above the centre, sloping gently to the front and more abruptly to the sides. The muscular impression is comparatively small, subelliptical in form, the longitudinal being a little greater than the transverse diameter ; deeply bilobed by the callosity of the adductor muscle, and the sides somewhat distinctly lobed in about three divisions. The surface of the cast, below the muscular impression, is faintly marked by the vascular impression, and the margin strongly striated. The distance from the beak, or filling of the rostral cavity, to the lower side of the muscular impression, is less than half the length of the cast.

The cast of the dorsal valve is nearly flat, with an oval muscular area which is deeply divided in the centre from the pit made by the cardinal process and its extension along the interior of the shell, whence it becomes bifurcate. The muscular impression is transversely divided by a ridge extending from the median line, as in species of the type of *Orthis elegantula.*

The casts of these two valves, which I have placed under one designation, have not been found in actual connexion ; but the character of the ventral valve requires a dorsal valve of the form described, and *vice versa ;* while the two occurring in the same locality, and of equal rarity, I can feel little hesitation in considering them of the same species.

Geological formation and locality. In the Schoharie grit : at Clarksville and Knox, Albany county.

"ORTHIS ALSUS (n. s.)."

SHELL somewhat semielliptical in outline : cardinal line equal to, or more than two-thirds the greatest width, which is near or just below the middle. Dorsal valve more convex than the ventral, the greatest convexity being about the middle, sloping almost equally to the sides and front and less rapidly to the beak, while it is flattened or concave towards the cardinal angles. The centre is marked by a sinus from the beak, which gradually expands to the base of the shell. Ventral valve depressed convex, and nearly flat in the middle of the lower half: beak small and neatly defined, projecting slightly beyond the area-line; area narrow sublinear, a little inclined; foramen partially filled by the strong cardinal process of the opposite valve. Area of the dorsal valve comparatively large, equal to two-thirds the width of the area of the ventral valve, flat or lying in the plane of the margins of the valve.

SURFACE marked by fine, somewhat unequal bifurcating striæ, about eight or nine in one-fifth of an inch, much curved on the upper lateral margins.

The casts of this species are of the character of *O. oblata* of the Lower Helderberg, and others in the Hamilton group; but the hinge-line and area are much more extended, distinguishing this species from any in those strata with similar muscular impressions.

The cast of the dorsal valve, when the impression of the area is not preserved, is not readily distinguishable from some of those mentioned; though in well-preserved specimens, the depression down the centre, and also across the middle of the muscular impression, is more strongly marked than in those species.

The muscular impression of the ventral valve is proportionally small, being usually less than half the length of the valve; but it is almost always strongly defined, which, with the long hinge-line, are marked features.

This species occurs in the Schoharie grit in the condition of casts of the interior, with impressions of the exterior surface, usually as separated valves, and rarely with the impression of both valves in their natural relation. From one of these specimens, a cast in sulphur has given the exterior form and proportions of the fossil, as well as the surface markings; and a single dorsal valve, retaining the shell, has been found among the entire collection from this rock.

Geological formation and locality. In the Schoharie grit: at Clarksville, Knox, and other places in the Helderberg mountains in Albany county, and also in Schoharie county.

"ORTHIS MITIS (n. s.)."

Shell suborbicular, of moderate convexity; area about half the width of the shell; length and width about as four to five; cardinal extremities rounded.

Surface somewhat coarsely striated.

The cast of the ventral valve is depressed-convex above, depressed along the centre below, with a median groove from the adductor scar nearly to the front of the shell. Muscular impression elliptical, occupying less than half the length of the valve, and about one-third the width : lower half of valve marked by strong vascular impressions.

Two specimens in the State Collection, having respectively the length of about one-half and five-eighths of an inch, are referred with hesitation to this species. The cast of the ventral valve possesses characters which distinguish it from any species of which I know the interior. It is possible that these may be the young of *O. livia*, of which I do not know the interior at this time.

Geological formation and locality. In the Schoharie grit, in Albany and Schoharie counties.

"ORTHIS SEMELE (n. s.)."

Some imperfect specimens showing the interior of the ventral valve, and also a small specimen of the ventral valve, possess characters approaching very nearly to *O. vanuxemi*. From the same locality there have been obtained casts of a dorsal valve, which are more elevated in the middle, with the apex more produced that in that species. These casts give indications of a median sinus with an elevation on each side of it, and thence an abrupt slope to the cardinal extremities, and curving to the front and lower lateral margins.

In this character, they more nearly resemble the dorsal valves of *Orthis leucosia;* while the muscular impressions of the ventral valves, from the same locality, are broader than in that species. The hinge-line of a ventral valve is three-fifths the greatest width of the shell, which is greater than in either *O. vanuxemi* or *O. leucosia*, while the striæ are also much coarser. This specimen occurring with the others, while no other form of ventral valve has been seen in the same association, indicates the probable relations of the other specimens.

Although the material in my possession is too imperfect for a complete description, I have indicated the prominent features of the species, in order to call attention to the occurrence of this form in the limestones of the Upper Helderberg group.

Geological formation and locality. In the Onondaga limestone : near Clarence hollow, Erie county. I have seen a similar form from the limestone near Columbus, Ohio.

"ORTHIS CLEOBIS (n. s.)."

SHELL broadly semielliptical or subquadrate, the cardinal line being straight, and extending fully two-thirds the width of the shell; cardinal extremities rounded. Dorsal valve of a little more than the medium convexity; the greatest elevation about the centre, from which it slopes almost regularly to the beak, the front, and the lower lateral margins; while towards the cardinal angles it is more abrupt, and becomes slightly concave. Ventral valve depressed-concave, flattened at the sides, with a broad shallow sinus which becomes deeper towards the margin.

SURFACE finely striated; the striæ much curved upwards at the sides.

In the cast of the dorsal valve, the distance from the beak to the lower edge of the muscular impression is about one-half the length of the valve: the area is in the plane of the lateral margins, comparatively large, having a width of about 0·18 of an inch. The cast of the ventral valve shows a large flabelliform muscular impression, from the base of which to the apex of the cast is about two-thirds the entire length, while its width is about three-fifths the width of the shell. The cicatrix for the cardinal muscle is very strong; and below it is a narrow sinus, indicating the existence of a strong median ridge. The ventral area is unknown, but it has probably been considerably larger than that of the dorsal valve.

The description is drawn from the casts of two valves, which, in some parts, preserve a little of the shell.

The long hinge-line is a characteristic feature of the shell; while the large area of the dorsal valve, and its well-marked muscular impression, distinguish it from nearly all the other species. The muscular impression of the ventral valve is remarkably large and rigidly flabelliform, with the margins strongly defined.

The casts are associated in a thin band of limestone of peculiar character, leaving no reasonable doubt of their being of the same species; while another ventral valve, referred with some doubt to the same, was likewise found in the same horizon, in the lower beds of the series.

This species, in its large muscular impression, is similar to *O. musculosa* of the Oriskany sandstone; but the dorsal valve is not so convex, the hinge line is much longer, and the dorsal area much larger.

Geological formation and locality. In the Onondaga limestone: near Williamsville and Clarence, Erie county.

ORTHIS ERYNA.

Orthis equivalvis: Tenth Report on the State Cabinet, 1857, p. 109.
Not *Orthis æquivalvis*, Pal. N.Y. Vol. i, p. 120.
See DAVIDSON, Geological Journal.

This species was inadvertently described under the name *Orthis equivalvis*, in the Tenth Report on the State Cabinet. A species under the same name will be found in Vol. iv, Palæontology of New-York, illustrated on Plate 5; but the name is preoccupied by an Upper Silurian species of DAVIDSON.

ORTHIS LIVIA.

Orthis livia : Billings, Canadian Journal, No. xxvii, p. 266.

Two individuals, apparently of this species, have been found in Western New-York. It has a larger area and much coarser striæ than the *O. vanuxemi* and some others of similar character.

GENUS STROPHODONTA (Hall).

The Schoharie grit has afforded characteristic examples of several species of this genus which are known in the higher rocks, or as ranging through the Upper Helderberg limestones and the Hamilton group. Among these are *Strophodonta demissa*, *S. inequistriata*, and *S. crenistria* = *S. fragilis*. There are, besides these and some other known species, several very distinct forms which are known only in the condition of casts.

STROPHODONTA ALVEATA (n. s.).

Casts of the ventral valve nearly flat, and varying to slightly concave or convex; semielliptical in form, the hinge-line equalling or sometimes a little less than the greatest width of the shell, crenulated. Muscular impression strongly marked; the sides very straight and limited by a deep groove, divided along the middle, and each side bilobed at the lower margin. Near the exterior margin of the valve there is a depression reaching from the hinge-line entirely around the front of the shell, indicating a thickening upon the interior of the valve, which is marked by the striæ, and by vascular impressions in well-preserved specimens.

The cast of a dorsal valve (found with the ventral valves) of the same form, shows the submarginal callosity, a crenulated hinge line and double cardinal process, with a muscular impression similar to that of the dorsal valve of *S. rugosa*. Length from one-half to three-fourths of an inch, with a greater breadth.

Geological formation and locality. In the Schoharie grit: at Clarksville and Knox, Albany county.

STROPHODONTA CALLOSA (n. s.).

Casts of the ventral valve semielliptical, longer than wide, or sometimes with length and breadth nearly equal, very convex or gibbous; width across the middle of the valve, greater than at the hinge-line and a little below; area wide; hinge-line

crenulated. Muscular impression strong, deeply bilobed, with a wide groove between the divisions. The margin of the valve (in the cast) is elevated; and within this is a depression, while the space between this and the muscular impression is marked by punctate vascular impressions.

The casts are rarely more than half an inch in length, and are readily recognized by the convexity, the narrow elevated border, and the comparative shortness of the hinge-line.

Geological formation and locality. In the Schoharie grit: at Clarksville and Knox, Albany county.

STROPHODONTA CREBRISTRIATA.

Strophomena crebristriata[?] CONRAD, Journal Acad. Nat. Sciences, Vol. viii, p. 254; Pl. 14, f. 3.

There is a small species of STROPHODONTA in the Schoharie grit, having a width of about half an inch, which I have referred with some hesitation to the above cited species. The casts are well marked; that of the ventral valve somewhat gibbous, with a bilobed but not strongly defined muscular impression; while the lower part of the surface is marked by vascular imprints, without marginal callosity.

The partially preserved shell is marked by numerous fine bifurcating striæ.

Geological formation and locality. In the Schoharie grit: at Clarksville and Knox, Albany county.

STROPHODONTA PARVA (n. s.).

SHELL small, subhemispheric, a little wider than long. Ventral valve gibbous: hinge-line usually a little shorter than the greatest width of the shell; area linear.

SURFACE marked by few, strong, rounded or subangular striæ or costæ, which are bifurcated or increase by bifurcation towards the margin, and are covered by minute or almost microscopic undulating striæ. The larger striæ are sometimes marked by a sharp elevation along the middle.

In exfoliated specimens, the surface has the aspect of those with fascicles of fine striæ, with single sharp elevated striæ between. The form and proportions of the species is very constant, rarely exceeding and usually less than half an inch in width.

Geological formation and locality. In the Schoharie grit of Albany and Schoharie counties.

2. OBSERVATIONS UPON SOME OF THE BRACHIOPODA,

WITH REFERENCE TO THE CHARACTERS OF THE GENERA

CRYPTONELLA, CENTRONELLA, MERISTELLA, TREMATOSPIRA, RHYNCHOSPIRA, RETZIA, LEPTOCŒLIA,

AND ALLIED FORMS.*

In the study of the Palæozoic Brachiopoda, we are often forced to rely upon the general external form, and texture of the shell, for determination of the generic relations, until more extensive collections may furnish weathered specimens, or crystalline or silicified ones, which, admitting of being cut and macerated in acid, will enable us to ascertain the true interior characters.

In many instances, so nearly do very distinct genera approach each other in their external form, that reliance on this alone is very uncertain, and will surely lead to much confusion if insisted upon as the means of generic determination.

For a long time, and until we began to learn something of interior structure, a large number of species, now known to belong to distinct genera, were embraced in the designations Terebratula and Atrypa. At a later period, when the Genus Rhynchonella had been recognized in its application to many palæozoic forms, we find numerous species, which from external characters had been referred to that genus, possessing characters incompatible with it.† Among these, some of the forms which have been placed under the Genus Retzia are not readly separable from well-marked species of Rhynchonella, as will be seen in referring to the species placed under the former genus.

So long as we remain unacquainted with the interior of the shell, we are compelled to refer the species to some genus having similar external forms, though the fibrous or punctate texture may in many instances prove a valuable aid in these references.

Among the forms most difficult to determine are the numerous smooth or finely striated terebratuloid shells, having either ovoid, elongate, subcircular, or transverse forms. Among the genera of

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* This article was originally prepared for the Report on the State Cabinet; but a part of it has been already published in the Transactions of the Albany Institute, in February 1863. Some changes have since been introduced into that part, from information subsequently obtained in reference to the interior structure of Centronella.

† The Genus Rhynchonella was established in 1809, many years before the Genus Atrypa was proposed; but the former was, for a long time, not fully recognized in the French and English publications.

one family which in recent times have been established and proposed to receive these, are ATHYRIS (= SPIRIGERA), MERISTA (= CAMARIUM), MERISTELLA and CHARIONELLA; while the subdivision of the terebratuloid forms in another direction has given TEREBRATULA proper, TEREBRATULINA, WALDHEIMIA, TEREBRATELLA, CENTRONELLA, CRYPTONELLA, RENSSELÆRIA, &c.

The first four are of the athyroid type, and have internal spires, as in SPIRIFER. *The shell in all these is fibrous; and we have, therefore, in the external shell, the means of separation from those of the other type.*

In all the latter group we find modifications of the internal appendage, called in TEREBRATULA *the loop;* but in none of them do spires exist. Moreover, *in all these the external shell is punctate;* and we do not yet know a punctate shell of the external character here indicated, which contains internal spires.*

The external characters, therefore, of the terebratuloid forms may be made useful in indicating the family relations of the species, and may prevent us from referring to the Family SPIRIFERIDÆ those which belong to the Family TEREBRATULIDÆ.

In the Thirteenth Report on the State Cabinet, published in 1860, I proposed the name MERISTELLA for certain forms which I regarded as separable from ATHYRIS and MERISTA; and for the semiplicated forms otherwise of similar external character, I suggested the name LEIORHYNCHUS. At the same time I described, under TEREBRATULA, the following species : *T. linckläni*, *T. rectirostra*, *T. lens* and *T. planirostra;* under each one, distinctly stating the shell structure to be punctate, which character at that time afforded me the principal means of distinguishing these from athyroid species of similar form, as *Meristella haskinsi*, *M. barrisi* and *M. doris*, which, with *Atrypa scitula* (Fourth District Report) = *Meristella scitula*, have at a later period been placed by Mr. BILLINGS among the typical forms of his Genus CHARIONELLA.

Having ascertained some farther characters of these punctate terebratuloid shells, I proposed, in the Fourteenth Report on the State Cabinet,† page 102, the name CRYPTONELLA, giving as one of the characters "shell structure finely punctate." I remarked, in a concluding paragraph :

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* The plicated forms of RETZIA and RHYNCHOSPIRA are of course not included in the designation above made. The NUCLEOSPIRÆ also approach the terebratuloid forms; but these have an area on the ventral valve, and a different hinge structure.

† Made to the Legislature April 10th, 1861, and published in July 1861.

"The species of this genus are more elongate than MERISTA and MERISTELLA; and those now known are less distinctly marked by mesial fold and sinus, while the beak is more attenuate, often a little flattened, and rarely so closely incurved as in the genera cited. The punctate structure of the shell is a distinguishing feature."

In the Fifteenth Report on the State Cabinet, I gave (at page 161 [133], Plate 3) some illustrations of the muscular imprints, dental lamellæ, etc., with figures of a single additional species from the Lower Helderberg group.*

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* In the *Canadian Naturalist and Geologist* for October 1862, we find the following exposition of the relations of the Genus CRYPTONELLA:

"The Genus CRYPTONELLA, illustrated on Plate 3, p. 133, is precisely identical with CHARIONELLA, described by me in the *Canadian Journal* of March 1861, p. 148, and illustrated in the May number, pp. 273, 274. It includes the species described by Professor HALL in the Thirteenth Report under the names of *Meristella haskinsi, M. barrisi, M. doris, Terebratula lincklæni, T. rectiroslra, T. lens* and *T. planostria* [*T. planirostra*]. Besides these, the *Atrypa scitula* of the New-York Reports, *C. circe*, and apparently a number of European species, belong to it. CRYPTONELLA was first published in July or August 1861, three or four months after the learned author became acquainted with its characters through the study of my papers."

The following is the description of the Genus CHARIONELLA, copied from the *Canadian Journal* (March 1861), No. xxxii, p. 148:

Genus CHARIONELLA. "Since the foregoing artiele on Devonian fossils was written, I have ascertained the generic characters of the so-called *Atrypa* or *Athyris scitula*. It has internal spires with their apices directed outwards, as in ATHYRIS and SPIRIGERA; but the dorsal hinge plate has its anterior margin, and a large portion along the middle, anchylosed to the bottom of the valve. In another congeneric species, the middle portion of the same plate is obsolete; there remaining only two small, thin, nearly vertical septa (socket plates), one on each side of the cavity of the umbo. The perforation in the beak of the ventral valve is bounded on the lower side by a deltidium of either one or two pieces, or by a portion of the shell. The mesial septum in the dorsal valve is either rudimentary or entirely absent.

"The several species of this group, at present known to me, resemble ATHYRIS, but are not so convex, and are besides more elongate-ovate, or approaching to TEREBRATULA in general form. I shall give further details and some figures in the next number of the *Journal*.

"The genus is only proposed as a subgenus, to be retained in case ATHYRIS is divided."

In the *Canadian Journal*, No. xxxiii, p. 273, we have "CHARIONELLA CIRCE, n.s." (referring to the illustrations). "The first figure exhibits a specimen with the dorsal valve partly removed, showing *the internal spires*. The other two figures are a side and ventral view of another specimen."

"By treating partially silicified specimens of this genus with acids, I have ascertained that the structure of the hinge plate differs from that of SPIRIGERA in being either obsolete along the middle, or anchylosed to the bottom of the valve. In ATHYRIS (=MERISTELLA, Hall), there is a well developed hinge plate, supported beneath by a strong mesial septum which extends sometimes nearly to the front of the valve. In CHARIONELLA there is either no mesial septum, or one that is merely rudimentary. In one specimen there is a remarkable partition, which runs obliquely from near the beak to the margin near the front. It completely divides the internal cavity into two parts. This I believe to be not a mesial septum, but a temporary wall formed by disease; *because both spires are crowded into the smaller of the two cavities, the larger being empty.*"

The Genus CHARIONELLA, therefore, clearly belongs to the SPIRIFERIDÆ; and the typical species cited are in part those originally placed by me under the Genus MERI-

In September 1862, Prof. A. Winchell, in his "*Description of Fossils from the Marshall and Huron groups of Michigan*," published a description of *Centronella julia*, in which he describes the loop, which proves to be very distinct from that of Centronella as described and illustrated in the *Canadian Naturalist and Geologist*, Vol. iv, April 1859.

Through the kindness of Prof. Winchell, I have been put in possession of some specimens of this species, with parts of others illustrating the internal structure, together with drawings representing the loop.

An examination of the external characters shows that the shell has the form and texture of Cryptonella : "Both valves with regular lens-like convexity, shell obsoletely striate concentrically, and having a minutely punctate structure." The form and other characters of the cast are like that of species referred by me to Cryptonella. In the ventral valve are two delicate, slightly curving dental lamellæ, which are shown in casts by a narrow slit on each side of the beak. "The casts exhibit on the ventral side a delicate impressed line extending from the beak to the middle, and on the right and left of this a fainter one; on the dorsal side, a median impression, with two fainter ones on the right and two on the left." These characters appertain to the casts of Cryptonella (See figs. 6 & 9), as shown in the ventral side of large individuals; having three defined, slightly impressed spaces, limited by narrow lines which extend to the middle of the shell, below which there are sometimes vascular impressions visible.

On the dorsal side we have the median impressed line with two fainter ones on each side, which, in some conditions of preservation, are obscured by the muscular impression; and below these are frequently seen diverging vascular impressions.

The internal loop of *Cryptonella julia*, illustrated from drawings of Prof. Winchell, is shown in figures 1 and 2, which are four times enlarged, and are thus described by him : "A delicate ribbon-like loop originates from the stout blunt crura on each side of the socket-valve, having its flat sides at first vertical : the two branches of the loop proceed at first in lines parallel or a little convergent, and then gradually diverge, widening as they proceed, and assuming an inclined position, until, approaching the front

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stella in 1860 (Thirteenth Report on the State Cabinet, page 84), and a part under Terebratula, from the characters of which I proposed the Genus Cryptonella in 1861. The former belong to the Spiriferidæ, and the latter to the Terebratulidæ.

of the valve by a regular curvature, the lower edge has become anterior, giving the band an angle of 80° with the plane of the shell: approaching the median line, the band rapidly widens, and the front margin is drawn forward in a long acumination, while the inner margin is regularly concave, except that near the median line it turns abruptly forward so as to meet that line at an acute angle. The loop thus forms an urceolate figure on its inner margin, and on the outer a somewhat oval one, truncated behind and attenuately acuminate before. In the median line where the two branches meet, both are suddenly deflected downwards, forming a double vertical plate, not quite reaching the ventral valve; the upper edge of which, when viewed from the side, is flatly roof-shaped, while the lower edge describes two convexities, the greater anterior, leaving a notch between them. The surfaces of the loop and median plate are covered with minute obliquely conical pustules, in some places seeming to become spinulous."

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 1. Dorsal view of *Cryptonella (Centronella) julia*, showing the loop and horizontal plate.
FIG. 2. Profile view, showing one band of the loop with the vertical plate.
FIG. 3. Front view of the loop.

1 & 2 are from drawings, four times enlarged, by Prof. WINCHELL.

FIG. 4.

FIG. 5.

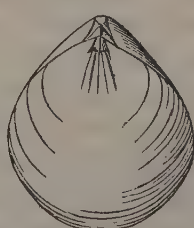


FIG. 6.

FIG. 7.

FIGS. 4 & 5. Ventral and dorsal views of a cast of a more oblate form of *Cryptonella julia*, enlarged to correspond with figs. 1 & 2.
FIGS. 6 & 7. Ventral and dorsal views of *C. meta*, from the Schoharie grit.

Fig. 4 is given simply to show the dental lamellæ of the ventral valve. The delicate impressed line in the centre, and a fainter one on each side,

described by Prof. Winchell, are not shown in the figure. These marks, however, are shown in figs. 6 & 9, and characterize the ventral valves or casts of this valve in all the known species of the genus.

Fig. 8.

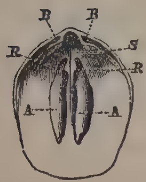


Fig. 9.

Fig. 10.

Fig. 11.

In the Fifteenth Report on the State Cabinet, I gave the accompanying fig. 8 of the dorsal valve, and fig. 9 of the interior of a ventral valve. Figs. 10 & 11 are dorsal and profile views of *Cryptonella eximia*, from the Lower Helderberg group, the earliest species of the genus known to me.

The Genus Cryptonella may be characterized as follows :

GENUS CRYPTONELLA (Hall, 1861).

Shells terebratuliform, equilateral, inequivalve, elongate or transverse, ovoid or sublenticular in form, without mesial fold or sinus, or with these features very slightly developed towards the base of the shell. Ventral valve with the beak extended or incurved, and terminated by a circular foramen, which is limited on the lower side by two small triangular deltidial pieces (these are sometimes not visible externally, and the lower side of the foramen is concealed by the umbo of the opposite valve). Shell-structure finely punctate : surface marked by fine concentric striæ, which are sometimes obsolete. Valves articulating by teeth and sockets, the dental lamellæ of the ventral valve extending in thin vertical plates into the cavity of the valve. The muscular impressions of the dorsal valve are strongly marked above, and extend in two narrow, gradually widening impressions, more than halfway to the base. The ventral valve shows elongated muscular and vascular impressions below the rostral cavity.

In the dorsal valve, the hinge-plates, or bases of the crura, support a slender loop, the two limbs of which are flattened, with the faces vertical; and in its extension forward, the upper margins are inclined towards each other, gradually widening and becoming conjoined in the centre, and thence extending forward,

form a single lanceolate plate, which may be more or less attenuate in front. These laminæ of the loop, after becoming thus conjoined and spreading laterally, are abruptly deflected in a vertical plate along the median line, extending into the cavity of the ventral valve, as shown in figure 2; while looking upon the dorsal side of the loop, this vertical plate may sometimes be seen projecting backwards between the bands of the loop, as well as extending in front, as shown in fig. 12.

FIG. 12.

CRYPTONELLA.

In casts of the ventral valve, we find the marks of two thin dental lamellæ extending to a greater or less distance below the beak. Along the median line in the ventral cast, there is usually a narrow flattened space limited by a slender line; and on each side a less distinct narrow space, limited in the same manner. In the cast of the dorsal valve, there is a median impressed line, and two of less strength on each side of this.

The species of this genus, known to me, are the *Cryptonella* (*Centronella*) *julia*, and those described as TEREBRATULA in the Thirteenth Report on the State Cabinet, and which in the Fourteenth Report were referred to CRYPTONELLA, viz. *Cryptonella* (*T.*) *rectirostra*, *C.* (*T.*) *lens*, *C.* (*T.*) *planirostra;* and *C. eximia* of the Fifteenth Report, as well as a new species from the Schoharie grit.

The *Terebratula lincklæni*, which has the external characters of CRYPTONELLA, and which I have referred to that genus, presents some slight differences in the muscular impressions, which, taken together with its rotund form, are suggestive of true TEREBRATULA, to which genus it may possibly belong.

The species of the Genus CENTRONELLA, heretofore described, have the ventral valve highly convex or subangular in the middle, with the dorsal valve flattened or concave in the middle, or with a median depression and convex at the sides.

The characters of the genus, as given in the descriptions and illustrations of Mr. BILLINGS, are as follows:

GENUS CENTRONELLA (Billings,* 1859).

"Generic characters. Shells having the general form of Terebratula. Dorsal valve with a loop consisting of two delicate riband-like lamellæ, which extend about half the length. These lamellæ at first curve gently outwards, and then approach each other gradually, until at their lower extremities they meet at an acute angle; then becoming united, they are reflected backwards towards the beak in what appears to be a thin flat vertical plate. Near their origin, each bears upon the ventral side a single triangular crural process. Name from the Greek, *kentron*, a spur. This genus is intermediate between Terebratula and Waldheimia. In the former the loop is short, not exceeding greatly one-third the length of the shell, and not reflected: in the latter, it extends nearly to the front, and is reflected, but the laminæ are not united until after they are folded back."

Fig. 13. Fig. 14.

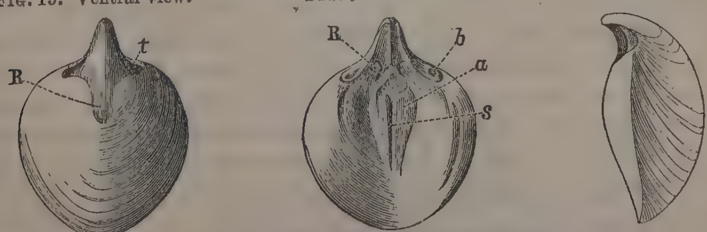
Fig. 13 [4]. Interior of the dorsal valve, showing the loop.
Fig. 14 [5]. Longitudinal section, showing the position of the loop in the interior.

In Centronella, as illustrated by Mr. Billings, we have a simple loop, or the two limbs becoming united at an acute angle at the point of greatest anterior extension, whence they recurve in a thin vertical plate which is not attached at either margin; approaching, in some respects, to Waldheimia.

This feature of the internal loop is accompanied, in the cast of *C. glans-fagea*, the typical form of the genus, by other differences which distinguish it from the casts of known species of Cryptonella.

Cast of *Centronella glans-fagea*.

Fig. 15. Ventral view. Fig. 16. Dorsal view. Fig. 17. Profile view.



* Description and figures copied from the *Canadian Naturalist and Geologist* for April 1859: the figures enlarged three diameters.

In the cast of a ventral valve of *C. glans-fagea*, figure 15, we have the filling of a deep rostral cavity : the dental lamellæ have been thick and strong, not extending as thin plates into the cavity of the shell as shown in several species of CRYPTONELLA, but having a thick blunt termination which leaves no space, or scarcely an appreciable one, to be filled between it and the shell. The spur, or filling of the rostral cavity, is striated : at its base in the centre, on the body of the cast, is a depression; and on each side are fainter striated impressions, indicating the points of muscular attachment.

The interior of the ventral valve of *Centronella impressa** shows similar strong rounded and blunt dental lamellæ, with a deep rostral cavity and muscular markings, which would give a cast similar to that of *C. glans-fagea.*

The cast of the dorsal valve of *C. glans-fagea* presents a slightly concave surface, and, on each side of the apex, two large and deep cavities made by the bases of the crural processes; and between them is a narrow filling of stone. The centre is marked by a double muscular impression, the two parts separated by a narrow groove : above this, and at the base of the crura, are some points marked apparently for muscular attachment (See *b*, fig. 16).

The interior of *C. impressa* presents a very strong double process below the beak of the dorsal valve, corresponding to those in *C. glans-fagea.*

The external form of all the species heretofore referred to CENTRONELLA is a distinguishing feature, and, when shown to be accompanied by an internal apparatus so different from that of CRYPTONELLA, will serve to separate them from all the allied forms.

As before remarked, it has been mainly upon modifications of this internal loop, or the apophysary system, that the separation of most of the genera in the Family TEREBRATULIDÆ has been made. Through this fortunate discovery of Prof. WINCHELL, we are able in a perfectly satisfactory manner to place these forms, referred by me to CRYPTONELLA, in their true relations to other genera, which were before inferred from the punctate structure, peculiarity of foramen, deltidial plates, and muscular impressions.

In CRYPTONELLA we observe considerable analogy with RENSSELÆRIA, where the slender bands of the loop expand and unite in a broad plate, which is obtusely or acutely attenuate in front, and, on the ventral side, marked by a ridge along the line of junction; from which, at the posterior margin, proceeds a slender process into the ventral cavity. We may readily conceive of this central longitudinal ridge or carina along the cicatrix of the two parts, being produced into a thin vertical plate, and projecting backwards in the line of the process from the base of the conjoined lamellæ in RENSSELÆRIA, when it would much resemble the median plate of CRYPTONELLA (See figures 18, 19, 20 & 21).

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* A very distinct species from *C. hecate* (BILLINGS) of the Oriskany sandstone, which differs only in size from *Centronella (Rhynchonella?) alveata* (HALL), Tenth Report on the State Cabinet, 1857.

FIG. 18. FIG. 19. FIG. 20. FIG. 21.

From the data here given, it will be seen that the Genus CRYPTONELLA is nearly related to CENTRONELLA, though both may perhaps be regarded by some palæontologists as of only subgeneric value, differing as much from each other as the former does from RENSSELÆRIA, or as TEREBRATULA from TEREBRATULINA or WALDHEIMIA.*

CENTRONELLA *glans-fagea.*†

* After the preceding observations had been written and printed,* I received from Dr. ROMINGER a drawing of the interior of the *Centronella glans-fagea,* which has been copied in the accompanying figure, and was likewise inserted in the supplementary note to the paper referred to above.

Since that time I have examined, and have now before me, the specimens of Dr. ROMINGER; and I can have no hesitation in pronouncing them identical with typical specimens of the *C. glans-fagea.* It is possible that some closely allied form may present the peculiarities of the loop illustrated by Mr. BILLINGS; but it seems probably due to imperfection of the specimens, or displacement of the parts. At a later period (May 1861), Mr. B. has published *Centronella hecate;* giving, in one of his illustrations (figure 99 *a*), "A specimen with the dorsal valve removed, "showing the loop, which is covered with minute crystals of silex." Since no mention is made of any differences observed between the loop of this species and that published in 1859, we may presume it to have been similar.

In my former paper, I have expressed some hesitation in regard to placing those forms which I had referred to CRYPTONELLA, in the Genus CENTRONELLA;‡ but after a careful examination of specimens of *C. glans-fagea,* showing the internal loop, I shall venture to suggest the merging of the Genera CENTRONELLA and CRYPTONELLA into one, retaining the former name which has precedence in time.

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* Transactions of the Albany Institute, Vol. iv, February 1863.

† Interior, showing the loop, from a figure by Dr. C. ROMINGER.

‡ "We are therefore scarcely warranted in placing in the Genus CENTRONELLA, species having an internal organization so different as that observed in species of authentic CRYPTONELLA, until a reëxamination of the original specimens of Mr. BILLINGS shall confirm his first observations, or show them to correspond with those of the genus last named" (Transactions Albany Institute, Vol. iv).

It is not probable that materials for other genera, or for reference to established genera, are yet exhausted among the TEREBRATULIDÆ of the Upper Silurian and Devonian rocks. While engaged in these investigations, Dr. C. ROMINGER has kindly sent to me a fossil from the Hamilton shale of Thunder bay (Michigan), in which the terebratuloid loop is distinctly visible. The form of the shell is ovate, not very unlike CRYPTONELLA (= CENTRONELLA), but more rotund, the lateral edges more incurved, and the space below the beak of the ventral valve not so great, nor the deltidial plates so conspicuous as in species of that genus. On a critical examination of the interior, after cutting away the crystalline filling of the shell nearly to the loop, I am unable to find any difference between it and true TEREBRATULA; and we have, so far as I know, for the first time the positive determination of this genus in our Devonian rocks. The position and proportions of the loop are shown in fig. 22, which is an outline of the shell from the dorsal side, twice enlarged. Fig. 23 is an enlargement of the loop, showing the crural process.

FIG. 22.

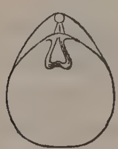
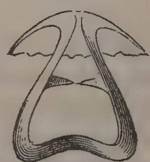


FIG. 23.



FIGS. 22 & 23. Illustrations of *Terebratula romingeri* (WINCHELL).

At the same time, Dr. ROMINGER has also sent me specimens of *Terebratula melonica* of BARRANDE, one of which he has prepared so as to show in a very satisfactory manner the loop in its entire extent. The specimens correspond with those I have received from M. DE VERNEUIL under the same name, and therefore we must regard them as authentic. The external form of *T. melonica* is not unlike some of the less gibbous forms of CRYPTONELLA, and is much less gibbous than the usual forms of WALDHEIMIA. The lamellæ are nearly parallel and near together, and the loop is extended four-fifths the entire length of the shell; when it is recurved, and, turning back, extends two-thirds of the distance to the beak of the dorsal valve. The crural processes are farther from the base of the loop than is represented in the typical figures of WALDHEIMIA, and are opposite the recurved extremity of the loop.

The accompanying figures illustrate all that has been observed in this species.

FIG. 24. FIG. 25. FIG. 26.

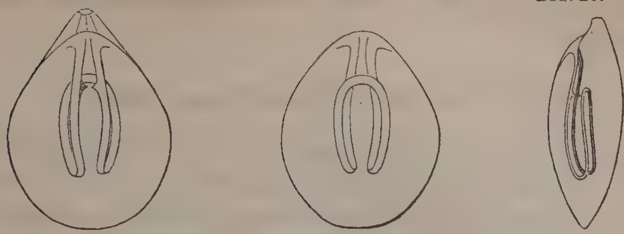


FIG. 24. Dorsal side of specimen, showing the crural processes directed downwards.
FIG. 25. Ventral side of specimen, looking into the dorsal valve.
FIG. 26. Profile view of same : the figures twice enlarged.

This species has been referred to the Genus RETZIA by Mr. DAVIDSON ;* but the specimens which I have examined, have not the character of area or interior structure of any of the typical forms of that genus.†

MERISTA AND MERISTELLA.

In the Thirteenth Report on the State Cabinet, 1860, p. 74, I proposed the Genus MERISTELLA, to embrace certain species before included under the Genus MERISTA, and which were shown not to possess the peculiar *shoelifter process*, or transverse septum characteristic of the latter genus. I remarked as follows : "Restricting, therefore, the signification of the Genus MERISTA to such forms as were originally included by Prof. SUESS under that name, it becomes necessary to designate those species of similar form, but without the peculiar appendage of the ventral valve, by another generic term ; and I would therefore suggest the name of MERISTELLA, proposed by me last year."‡

After describing the genus, I cited as illustrations several species from the Lower Helderberg group, and gave figures of the exterior of *Merista princeps* and *M. nasuta*, the latter species from the Upper Helderberg group.

In the same Report, I described three other species of the genus, viz. *Meristella haskinsi*, *M. barrisi* and *M. doris*, but without giving illustrations of them.

Since on the one side this genus has been claimed to be equivalent to ATHYRIS, and, on the other, the same author has placed some of its species under a later created Genus CHARIONELLA, it

* Introduction à l'Histoire naturelle des Brachiopodes, etc. 1856, p. 103.

† See Observations on the Genus RETZIA, on page 53.

‡ In the Twelfth Report on the State Cabinet, 1859, page 78, in referring *Atrypa naviformis* of Vol. ii. Pal. N.Y., to MERISTA, I said : "This species, and some others of the Clinton and Niagara groups, differ somewhat from true MERISTÆ; and should these differences prove of generic importance, I propose for them the name MERISTELLA."

seems necessary to repeat some of the characters of the genus in this connexion.

GENUS MERISTELLA (HALL, 1860).

THE genus includes *terebratuloid* or *athyroid* forms which are ovoid, more or less elongate, sometimes elliptical in outline, and not unfrequently transverse or subcircular. Valves unequally convex, with or without a median fold and sinus; and this feature, when present, usually confined to the lower half of the shell. Ventral beak more or less closely incurved (when closely incurved, apparently imperforate), terminated by an aperture, the lower side of which may be formed by the umbo of the dorsal valve or by a deltidium: area none.* Valves articulating by teeth and sockets.

SURFACE smooth or marked by fine concentric lines of growth (not lamellose), and indistinct or obsolescent radiating striæ, which are usually more conspicuous in the cast or exfoliated surfaces than on the exterior. Shell fibrous.

The ventral valve is much thickened on each side towards the beak, and the rostral cavity margined by flattened dental lamellæ, which extend downwards to the commencement of the muscular impression, and terminate at the edge of the shell in blunt tooth-like processes. The muscular impression forms a somewhat broadly triangular depression in the valve just below the rostral cavity. In the cast of this valve, we have the reverse of these features.

In the dorsal valve there is a strong hinge-plate or process, the prominent part of which is broadly triangular, somewhat depressed or spoonshaped in the centre, and supported below by a median septum which reaches from one-third to one-half the length of the valve, and on each side marked by deep dental fossets, while the anterior angles are produced into the crura which support the internal spires.

Spires arranged as in ATHYRIS and MERISTA, being a double cone with the apices directed outwards. From the lower lateral margins of the cardinal process or hinge-plate, there is a callosity extending beneath and anterior to the dental fossets, and joining

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* Those species with the ventral valve closely incurved are *apparently* imperforate, since no foramen is visible above the umbo of the dorsal valve. In the separated valves of these species, I have not seen any deltidium; an open triangular space exists above the points of the dental lamellæ, and this communicates with the open cavity of the valve.

with the thickened margin of the valve as in the other allied genera.

In the cast of the dorsal valve we have the mark of the median septum, with an elongate lanceolate muscular impression, reaching nearly to the middle of the valve. The imprint of the triangular process, and the cavities made by the crura, are often preserved.

The species of this genus may be readily distinguished from MERISTA by the absence of the shoelifter process, which, in numerous specimens compared, constitutes the principal difference between the two genera.*

The following illustrations will serve to show more clearly the characteristics of the genus :

FIG. 27.

FIG. 28.

FIG. 29.

FIG. 27. *Meristella nasuta* = *Atrypa nasuta* (CONRAD) = *Athyris clara* (BILLINGS). Dorsal view of a young individual.

FIG. 28. An older individual.

FIG. 29. Interior of the ventral valve.

FIG. 30.

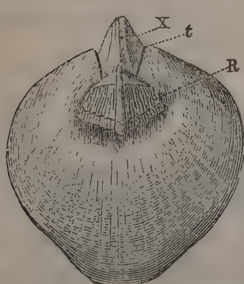


FIG. 31.

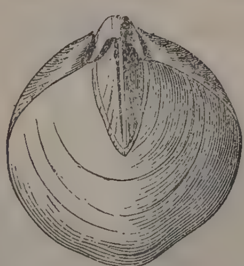


FIG. 32.

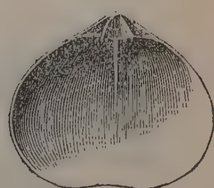


FIG. 30. Cast of the ventral valve of *M. nasuta*.

FIG. 31. Dorsal view of the same species.

FIG. 32. Interior of the dorsal valve of *M. arcuata*, showing the hinge-plate and median septum.

* On Plates 39 & 41 of the Palæontology of New-York, Vol. iii, may be found some illustrations of the casts of species of this genus.

FIG. 33.

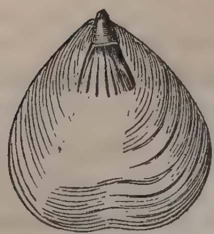


FIG. 34.

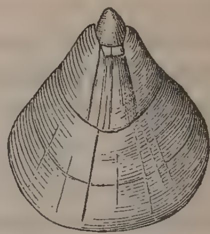


FIG. 33. Cast of ventral valve of *M. barrisi.*
FIG. 34. Cast of ventral valve of *M. haskinsi.**

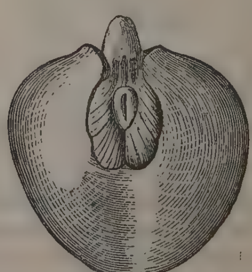
In the dorsal valve of *M. barrisi* we have a hinge-plate, with a median septum reaching more than one-third the length of the shell; and the same characters exist in *M. haskinsi.* In *M. doris*, the rostral cavity and muscular impression of the ventral valve are much elongated, and resemble what I have heretofore shown in *Meristella lævis.*† The dorsal valve has a strong extended median septum, and hinge structure as in the other species.

The proportions of length of rostral cavity and muscular impression vary in different species; and the muscular impression becomes much stronger and deeper in the older shells, when the valve, as before remarked, becomes thickened at the sides and towards the beak. This character pertains to the limestone specimens; while those in the Hamilton shales, as figs. 7 & 8, have thinner shells, and less deep and strong muscular impressions.

I have already (Thirteenth Report on the State Cabinet, pp. 73 – 75, and illustrations on p. 93) pointed out the distinction between ATHYRIS = SPIRIGERA and MERISTELLA. This difference is everywhere clear and unmistakable, in the external lamellose surface of the one, and the almost smooth character of the other. The muscular impressions of the ventral valve of ATHYRIS are at once distinguishable from those of MERISTELLA, as may be seen on comparison of figs. 35 & 36 with figs. 29 & 30.

FIG. 35.

FIG. 36.



* The casts of *M. barrisi* and *M. haskinsi* are obtained from solid specimens by removing the shells, and therefore have not that sharpness of the muscular markings which we find in weathered casts.

† Palæontology of New-York, Vol. iii, plate 39.

In the dorsal valve, the muscular impressions differ from MERISTELLA; the hinge-plate is of somewhat different character, and the median septum is scarcely developed.

The characters of the Genus MERISTA have been illustrated in a preceding Report.*

GENUS RETZIA (KING).†

In regard to the entire characters and limitations of this genus, there still exists some doubt and difference of opinion among palæontologists : nor is this difficulty removed by consulting the published accounts of the genus, and the species referred to it by several authors.

The genus is described by Prof. KING as follows :

"A SPIRIFERIDEA : in general oval longitudinally; ribbed or "striated; with large punctures. *Large valve* foraminated at or "near the apex of the umbone; with a triangular area. Type "*Terebratula adrieni*, DE VERNEUIL. This interesting genus, well "distinguished by the above characters from other SPIRIFE- "RIDÆ, such as *Retzia baylii* (*Terebratula id.*, DAVIDSON), *R.* "*bouchardii* (*T. id.*, DAV.), *R. oliviani* (*T. id.*, DE VERN.), and "*R. salteri* (*T. id.*, DAV.), *Terebratula ferita*, and some other "spirigerous terebratulæform species, I am strongly disposed "to regard as belonging to the same genus."

The author remarks : "It appears to be a purely palæozoic genus; being only found as yet in the Silurian, Devonian, and Carboniferous rocks."

Mr. DAVIDSON, in the English edition of his Introduction to the Study of the Brachiopoda, does not recognize RETZIA as a distinct genus; but, referring to it under the Genus SPIRIGERA = ATHYRIS, cites the species which have been placed under RETZIA, and expresses an opinion that farther information is required of the internal structure, before the true relations can be determined.

In the French edition of Mr. DAVIDSON'S Introduction, 1856, RETZIA is made a subgenus under ATHYRIS, ranking with MERISTA and UNCITES.

The type of the genus is *R. adrieni* (DE VERNEUIL, sp.); and the examples cited are *R. adrieni*, *R. serpentina* (DE KONINCK, sp.), *R. ferita* (DE BUCH, sp.), *R. esquerra* (DE VERN. sp.; *melonica*, BARRANDE; *salteri*, DAVIDSON, etc. etc.). The examples given in the illustrations of the same work, are *R. serpentina*, *R. ferita*, *R. mucronata*, *R. adrieni*.

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* Thirteenth Report on the State Cabinet, p. 93.

† Monograph of English Permian Fossils (Palæontological Society, 1850, p. 137).

Mr. WOODWARD, in his excellent Manual of the Mollusca (cited also by DAVIDSON), gives as the generic characters of RETZIA : "Shell punc-"tate, terebratula-shaped : beak truncated by a round foramen, rendered "complete by a distinct deltidium; hinge-area small, triangular, sharply "defined; interior with diverging shelly spires."

"Type, *Terebratula adrieni*, VERNEUIL. Example, *R. serpentina*, Carb. "limestone, Belgium, fig. 136."

The species which have usually been referred without hesitation to this genus, are of the type of *R. serpentina.* Recognizing the latter as typical of the genus, I have published two species of congeneric form from the Carboniferous limestone of the Western States.* Certain other forms, which have more nearly the character of *Terebratula adrieni*, I have united under the Genus TREMATOSPIRA ; while others, with a different hinge-structure, I have designated RHYNCHOSPIRA.

The species described under these various designations present wide differences of character; and it now becomes very desirable to ascertain which, if either, among them are congeneric with *R. adrieni*, which was originally made the type of the genus. To begin with those usually referred to RETZIA, of the type of *Retzia serpentina*, we have rotund, oval or ovate, terebratulæform shells, neatly defined in form, evenly plicated, without mesial sinus or fold ; the valves nearly equally convex, evenly rounded, and marked by numerous rounded costæ, which are wider than the spaces between. The hinge-line proper is short and nearly straight, one or both valves having a little auriculate extension on either side of the beak, and between these extends a sublinear or triangular area ; the dorsal side being straight, while the limitation on the ventral valve is more or less arched upwards. This area is always sharply defined, and is shown in the figure of Mr. WOODWARD, while it is very differently represented in the figure of *R. serpentina* given by Mr. DAVIDSON. On either side, beyond this area, is a smooth space on the margins of both valves ; but this gradually merges into the plicated surface, and has no distinct limitation or important significance.

The area, in species of this type, is peculiar, and unlike the area in any other palæozoic trebratuliform brachiopod known to me. If one can imagine the sharply limited area of some of the Spirifers contracted to the smallest dimensions, with the margins still as sharply defined, he may have an idea of its characters in the American species. The beak is incurved, and truncated by a round foramen. The structure of the shell is punctate, and internally it is provided with calcareous spires as in ATHYRIS.

In the specimens of this type which have fallen under my observation, there are no visible deltidial pieces under the beak. The dorsal valve, viewed separately, has much the aspect of a small pectenoid shell, and is provided interiorly with strong diverging lamellæ, which extend beneath the cardinal area of the ventral valve on either side of the centre ; while the same pro-

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* *Retzia verneuili* and *R. vera*.

cesses, extending into the cavity of the dorsal valve, gradually converge, and are united by a transverse concave septum; and beyond this, their continuation forms the crura or spiral arms.

The ventral valve has not shown dental lamellæ, or processes of any kind, beyond the converging edges of the shell beneath the beak.

The following figures illustrate in some degree the features above described:

FIG. 1.

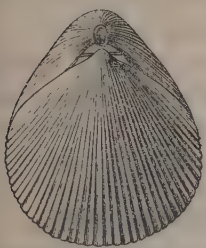

FIG. 2.

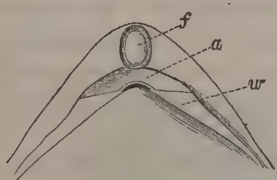

FIG. 3.

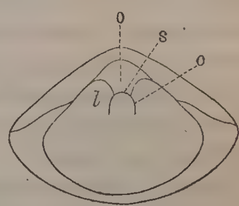

FIG. 1. *Retzia vera*, HALL. Specimen natural size, showing the area and character of surface.

FIG. 2. An enlarged figure of the upper part of *R. verneuili*, showing form and proportions of the area: *f*, foramen; *a*, area; *w*, the alation of the dorsal valve on each side of the umbo. The same feature is shown in the dorsal valve of figure 1. The slight but positive alation of the ventral valve, adjacent to the area, cannot be shown in the figure without enlargement.

FIG. 3. Transverse section of *R. vera* below the umbo, showing the diverging lamellæ *l* and transverse septum *s* uniting them, with their extension beyond (*c*).

In a single specimen longitudinally broken through, there is shown, on one side, the broad subtriangular plate *l*, from the ventral margin of which extends the concave or spoonshaped transverse septum s: this is united with a similar plate on the other side, leaving between the outer shell and these lamellæ the space o, as shown in the transverse section. The continuation of these plates in c apparently supports the spires, which are well shown in another specimen.

The specimens at my command are such as to afford but meagre materials for illustration; being all solid, and most of them distorted by pressure.

Unfortunately I have no specimens of *Retzia adrieni* for comparison; but if we may infer its relations from the figures given, it is probably a congener of the *R.* (*T.*) *ferita* which has the general features of RHYNCHONELLA, and is certainly quite distinct generically from *R. serpentina*. The shell of *R. ferita* is punctate, the beak of the ventral valve extended and perforated at the extremity with a round foramen, below which there is a narrow flattened area principally composed of two small deltidial pieces.*

* I have received from Dr. ROMINGER European specimens under the name of *R.* (*T.*) *diodonta*, which have the punctate structure and internal spires, and other characters in common with those designated above as *R.* (*T.*) *ferita*, and which I have supposed were authentic. The *T. diodonta* is regarded as a true RHYNCHONELLA, and by some European authors is cited as a variety of *Rhynchonella borealis*.

The *Rhynchonella cuneata* has a nearly similar form, but has not the punctate structure and internal spires,* though having a well-defined area below the beak.

These rhynchonelloid species, therefore, form a peculiar group, distinguished externally by the punctate texture; but the area and foramen are features common to the non-punctate forms.†

The *Retzia ovalis* (SANDBERGER),‡ though having internal spires, has a non-punctate shell; and in the specimens I possess, I am unable to find any distinct area. It has a large cardinal process in the dorsal valve, quite unlike anything in the *R. ferita*, and of a character totally different from the American species of the type of *R. serpentina*. In general form and surface characters, this species resembles *Atrypa* (*Leptocœlia*) *planoconvexa* of the Clinton group of New-York, the hinge-structure of which, as I have already indicated, differs in some respects from the LEPTOCŒLIA of the Oriskany sandstone.

Among those species which I have included under the Genus TREMATOSPIRA, the *T. camura* approaches in character to the group above mentioned; but it has a much more extended hinge-line and a distinct mesial sinus, with one or two smaller plications. A similar form from Tennessee has the sinus, with plications as on the sides. We have likewise a species in the Hamilton group (*T. gibbosa*), with simple plications and a well-defined sinus.

These species have all, however, a transverse diameter greater than the longitudinal diameter; which character is likewise true of *Terebratula salteri*, now referred to the Genus RETZIA.

In *Trematospira perforata* and *T. multistriata*, the plications are several times bifurcated, and there is a strong and well-defined mesial sinus and fold. In neither of these do we know the existence of deltidial pieces. There is a triangular notch or slit below the perforated beak; and on each side of this, a narrow flattened space. The *Trematospira costata* has the aspect of a SPIRIFER, is nearly twice as wide as long, and has a well-defined mesial sinus and fold.

To include these species in the Genus RETZIA, would require a considerable extension of the characters originally given to it; nor does it appear to me that such species as *R. ferita* can be naturally grouped with such as *Trematospira multistriata* and *T. costata* of the Lower Helderberg group, or *T. gibbosa* of the Hamilton group.

The following illustrations will afford the means of comparison among these different species.

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* The *R. cuneata* is cited in MURCHISON'S Siluria as RETZIA; but in examining European specimens of this species, as well as the American forms referred to the same, I have not found either punctate structure or internal spires.

† I have heretofore (Thirteenth Report on the State Cabinet, pp. 67 & 68) shown that in old specimens of *R. increbescens*, there is a perforated beak, and a solid triangular area below.

‡ Specimens received from Dr. ROMINGER.

FIG. 4.

FIG. 5.

FIG. 6.

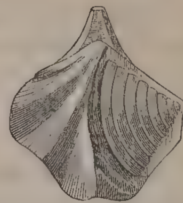


FIG. 4. *Retzia (Terebratula) adrieni,* copied from the figure of DAVIDSON : *The type of* RETZIA.

FIG. 5. *Retzia (Terebratula) ferita.**

FIG. 6. „ „ *ferita,* showing the internal spire on one side (enlarged).

FIG. 7.

FIG. 8.

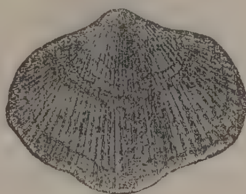


FIG. 9.

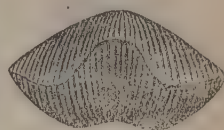


FIG. 7. *Trematospira perforata* : Enlargement of a part of the shell, showing the perforation of the beak and the area below, with umbo of the dorsal valve.

FIG. 8 & 9. *Trematospira multistriata* : Ventral and front views of a large individual.

FIG. 10.

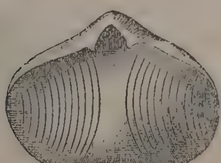


FIG. 11.

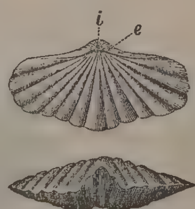


FIG. 10. *T. multistriata* : A ventral valve from which the dorsal valve has been removed, showing the spires as they appear on the polished surface of the stone.

FIG. 11. Dorsal and front views of *T. costata.*†

In the species which I have designated as RHYNCHOSPIRA, we have uniformly longitudinally ovate or subglobose forms, which are marked by regularly rounded or somewhat flattened plications; one, two, or more of which, in the centre, are always smaller than the others, though there is usually no defined mesial fold or sinus. The front is often truncated, and sometimes a little sinuous.

The general form and surface-characters of the species of this genus resemble those of *Retzia serpentina, R. vera* and *R. verneuili* ; but the smaller mesial plications are distinctive, and the hinge-structure and area are conspicuously different. The extremity of the beak is perforate, and

* This figure is about twice as large as any specimen of *R. ferita* which I possess.

† These figures are from the 12th Rep. on the State Cabinet, and Vol. iii, Pal. N.Y.

there is a triangular slit below, which may sometimes be filled by deltoidal pieces. The dorsal valve has a broad flattened cardinal process, which distinguishes it from those just mentioned, or from *R. ferita* and others referred to RETZIA. These features have been illustrated in the Twelfth Report on the State Cabinet, and in the third volume of the Palæontology of New-York.

The following illustrations are repeated here, for comparison with those already given.

FIG. 12.

FIG. 13.

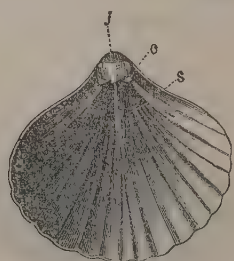


FIG. 14.

FIG. 12. Dorsal view of a specimen of *Rhynchospira formosa*, natural size.

FIG. 13. Interior of dorsal valve enlarged two diameters, to show the broad cardinal process *j* which covers the extremity of the beak, the bases of the crura *c*, and the short medio-longitudinal septum.

FIG. 14. Profile view of same, showing the cardinal and crural processes.

FIG. 15.

FIG. 16.

FIG. 17.

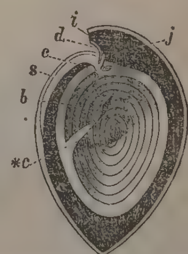


FIG. 15. Interior of ventral valve, natural size; showing the teeth, the deltidium, and the foramen.

FIG. 16. The upper part of the two valves, connected in their natural relations to each other, the ventral valve below; showing the teeth and sockets, the bases of the crura, and septum of the dorsal valve.

FIG. 17. Longitudinal section, showing the foramen and deltidium; the cardinal process of the dorsal valve lying beneath the latter. The crura are first bent downwards, and then recurved into the dorsal valve, continuing in the spire. The descending process *c is united with a similar one from the opposite side, which together form a connecting band between the two spires.

In the present state of our knowledge of the structure of these species, I can see nothing to be gained to science by uniting all these different forms under a single generic term.

It is clear that the Genus RETZIA must be restricted to one of three very distinct groups of species here presented; and should it be found to embrace, in the range of its typical species, some of those I have described as TREMATOSPIRA, it cannot, by any proper extension, include those of

Rhynchospira; while at the same time taking the direction of Trematospira, it must exclude all those of the type of *R. serpentina*, which would thus be left without a generic designation, and which in that event I would propose to name Eumetria.

The preceding remarks upon the Genus Retzia have been made more with the intention of calling the attention of palæontologists to the characteristics observed in several species, than of finally determining the question of generic relations among the several groups. The European material in my possession is quite insufficient to furnish satisfactory illustrations of all the parts which are desirable for comparison. My specimens of the type of *R. serpentina* have furnished no separate valves, and the little I have shown has been derived from very unpromising material. These species (and perhaps others of the same type) occurring in considerable numbers in the Carboniferous limestones of the Mississippi valley, will doubtless furnish to western collectors the means of determining the entire characters of this group.

NOTE ON THE GENUS LEPTOCŒLIA.

Among the specimens sent to me by Dr. Rominger, are two individuals of *Leptocœlia concava*, showing the existence of internal spires; and a careful examination of my own collections from the Lower Helderberg group has shown several specimens possessing these internal organs which have their apices directed obliquely outwards, and are connected near their origin by a strong vinculum on the dorsal side. After repeated examinations of a large number of the Oriskany sandstone species, from which the characters of the genus were mainly drawn, I have failed to detect internal spires. The form of the internal loop, as represented in the figures of the genus, was ascertained, as stated by me, mainly from cavities remaining in the crystalline filling of the shell. There were no appearances of spires; nor does a re-examination of the specimen afford any farther information, or indicate in any manner that spires have ever existed. The crura can be traced to the division at the process, and below this is a flat cavity.

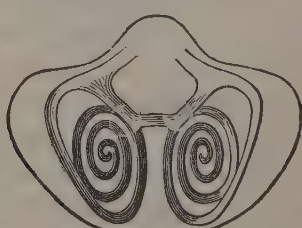
A critical re-examination of the fossils referred to this genus shows that there are at least three distinct types, in their external form and features, which, in the absence of positive knowledge of the internal structure, were grouped together. A farther examination shows some peculiarities of hinge-structure in each one

of them, which are probably connected with more important difference of the internal parts. One of these types is indicated in the two strongly plicated species of the Oriskany sandstone, which have a median sinus near the front of the ventral valve, with two of the plications often closely incurved. Another type is that of *Leptocœlia concava* and allied forms, which are more finely plicated, and having a sinus on the dorsal valve, though not distinctly defined. The third type is represented in *Leptocœlia* (*Atrypa*) *planoconvexa*, which has a somewhat undefined depression on the dorsal valve, and a form of cardinal process unlike the other species.* The internal structure of this species is still unknown.

The *Leptocœlia imbricata* proves to be a TREMATOSPIRA; and the same characters are apparent in *L. disparilis* of the Niagara group, the concavo-convex form of the shell being the only apparent deviation from typical forms of that genus. The *Terebratula lepida* of GOLDFUSS, as shown in the collections of Dr. ROMINGER, possesses internal spires precisely similar to those of *Trematospira camura.*

The *Leptocœlia concava*, both in its external characters and in the arrangement of the crura and vinculum, differs from TREMATOSPIRA; and with the knowledge at present possessed, I am compelled to separate this species from those last named, and from the *L. flabellites*, *L. fimbriata* and *L. acutiplicata.* I would propose to indicate forms of this external character, with similar crura and spires, as CŒLOSPIRA.

CŒLOSPIRA CONCAVA.



The difficulty constantly attending the references of the BRACHIOPODA to established genera from external form and characters, renders it very desirable to search for the interior organization and appendages; but the condition of specimens does not always admit of satisfactory investigations, and not unfrequently the

* Neither in this species, nor in the *Retzia ovalis* which has a similar form, have I been able to determine the existence of a punctate structure of the shell. The latter has internal spires, a feature not yet obsered in *L. couvexa.*

specimens possessed are so few as almost to preclude examinations of this kind.

As an example of the diversity of internal structure in similar external forms, I may mention the *Terebratula altidorsata* of BARRANDE, which so nearly resembles the *Centronella glans-fagea* that it might readily be mistaken for that shell. On cutting and macerating specimens of the former, they prove to possess internal spires arranged as in MERISTELLA, removing it from the family of the TEREBRATULIDÆ. I have not been able to determine positively whether the shell of this species is punctate or fibrous, from the specimens I possess; but it appears to be fibrous, and is probably allied to, or congeneric with MERISTELLA.

5. OBSERVATIONS UPON THE GENUS STREPTORHYNCHUS,

WITH REMARKS UPON SOME SPECIES HERETOFORE REFERRED TO THE GENERA *STROPHOMENA* AND *ORTHIS*.

GENUS STREPTORHYNCHUS (KING).*

THIS genus, although published in 1850, has not, until recently, been fully recognized by palæontologists. Mr. DAVIDSON, in his Introduction, has not considered the genus as distinct from ORTHISINA; and upon this authority, some of the American species have been placed under the latter, while other forms have been described as STROPHOMENA.

The description of Prof. KING is as follows:

"DIAGNOSIS. A Strophomenidia: inequivalved; striated or rib-
" bed; with the hinge approximating or equal to the width of
" the valves. *Umbones* more or less divaricating; the large one
" irregularly twisted. *Fissure* covered with a deltidium. *Dental*
" *plates* small, projecting more at the base of the area than at
" its apex."

"Type *Terebratula pelargonata* (SCHLOTHEIM)."

The characters here given, relating chiefly to external features, induced the reference to this genus of such species as have the beak of the ventral valve twisted or distorted, and the absence of a full knowledge of the interior left other species among the STROPHOMENA. In some later investigations, Mr. DAVIDSON has il-

* Monograph of Permian Fossils, 1850, p. 107.

lustrated the characters of the genus,* and we are now enabled to make satisfactory comparisons with some of the American species.

Most of the shells of this genus are closely related to STROPHOMENA: others have the external characters of ORTHIS, and are separable from that genus principally by the closed fissure; but the striæ do not usually curve up to the hinge-line, nor are the surfaces poriferous or punctate, in the species which I have examined. Like many of the palæozoic genera, they undergo considerable changes in the lapse of time, and the Permian *O. pelargonatus* has little similarity with some of the more ancient forms, which appear referable to this genus.

The shells of this genus are semicircular or semielliptical, concavo-convex or plano-convex, and sometimes with both valves convex. They are externally striated with rounded bifurcating threadlike striæ, which are crossed by fine concentric lines; and in some species the stronger striæ are distant, with finer radiating and concentric striæ cancellating the intermediate spaces. The ventral beak is sometimes prolonged and bent or twisted, and the fissure is closed or partially closed by a deltidium. A narrow area often exists on the dorsal valve, but this is not a constant character.

In this description, I have reference to the species before me, the half of which have not the beak prolonged or distorted. The exterior striation, in the older and the younger forms,† presents considerable variation; which may be characteristic, or this gradation may be apparent only in the series of specimens which I possess.

Referring to the structure exhibited in Mr. DAVIDSON's illustrations, I can have no difficulty in recognizing such forms as *Strophomena woolworthana* among the true STREPTORHYNCHI; while the *S. pandora* (BILLINGS) of the Schoharie grit and Upper Helderberg limestone, is an allied species. The *Streptorhynchus arctostriata* and *S. alternata* of the Hamilton group‡ approach more nearly to the Carboniferous varieties of European and American species.

In the *S. woolworthana*, the dental plates of the ventral valve are large and strong, widely diverging, gradually merging into the thickened margin of the flabelliform muscular impression. The muscular impression presents no important differences from that of many species of ORTHIS, or from that of *Strophomena alternata*. The foramen is partially closed, and the cardinal process of the opposite valve is seen filling the space below the deltidium. The dorsal valve is convex, while the ventral is flat or concave. The cardi-

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* Monograph of British Permian Brachiopoda, 1857, p. 29, and Plate ii, f. 32 – 42. Also British Carboniferous Brachiopoda, 1860 – 61, Plates 25, 26 & 27.

† Those from the older and the younger formations.

‡ Originally described as ORTHISINA in the Thirteenth Report on the State Cabinet, pp. 80 & 81. The extreme variation to which the known European species are subject, as shown by Mr. DAVIDSON, may lead us to suspect the unity of these two, though possessing well-marked differences in all the individuals examined.

nal process consists of a bifid projection, each division of which is doubly grooved upon its exterior face. The socket-plates are strong, and united to the base of the cardinal process; while from the origin of the latter proceeds a central median ridge, which is obsolete in some specimens. In these characters, the dorsal valve presents but slight differences from Mr. DAVIDSON's illustrations of *Streptorhynchus crenistria* in the Monograph of British Carboniferous Brachiopoda, Plate xxvii, f. 6 & 7.*

Similar characters are found to exist in *Strophomena subplana* of CONRAD.† This species, in well-formed individuals, has both valves convex; but the dorsal valve the more convex. The area of the ventral valve is but little wider than that of the dorsal valve; and while the foramen of the latter is closed by a distinct deltidium, that of the ventral valve is but partially, or, in some specimens, not at all covered. The cardinal process of the dorsal valve consists of two short divisions, supported by short and much elevated socket-plates; and externally it is partially, or entirely, covered and protected by the deltidium, which rises from the flat area of the same valve, curving outwardly over the process, and, in some cases, rising nearly as high as the latter.

The existence of this deltidium on the dorsal valve is not confined to this species of the genus; and in one at least of the Carboniferous species, it has a notch corresponding to the division of the cardinal process. This feature, however, is not peculiar to STREPTORHYNCHUS, but occurs in *Strophomena rugosa* and in *S. alternata*.‡

The following figures of *S. subplana* will serve to illustrate the characters here noticed.

FIG. 1.

FIG. 2.

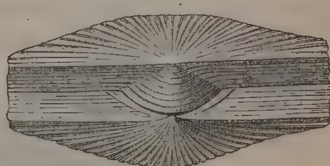

FIG. 1. Ventral valve of a large individual from Lockport, Niagara county.

FIG. 2. Cardinal view of a specimen from Waldron, Indiana (enlarged); showing the deltidium in the dorsal valve, while the foramen of the ventral valve remains open. In an imperfect specimen from Lockport, the ventral foramen is partially closed.

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* See illustrations of *S. woolworthana*, Pal. N.Y., Vol. iii, pl. 17.

† I have already indicated this species as belonging to the Genus STREPTORHYNCHUS, in Geol. Report of Wisconsin, published January 1862; and in Transactions Albany Institute, Vol. iv, April 1862, published May 1863.

‡ The same feature, in a lesser degree, is also shown in the woodcut figure (1) of Mr. DAVIDSON, Monograph of British Permian Brachiopoda, p. 29: Illustrations of the Genus STREPTORHYNCHUS.

FIG. 3.

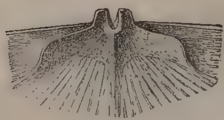


FIG. 4.

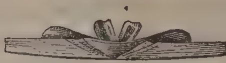


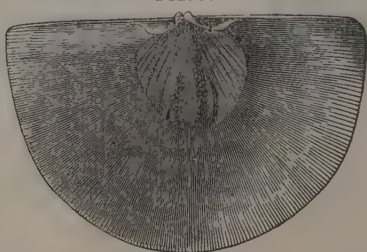
FIG. 3. View of a fragment of a dorsal valve from Lockport; showing the cardinal process, socket-plates, etc.

FIG. 4. Cardinal view of the same, showing the bidentate extremities of the cardinal process. Compare with similar figures of *Streptorhynchus crenistria* (PHILLIPS) : DAVIDSON, Monograph of British Carboniferous Brachiopoda, Pl. xxvii, f. 6 & 7.

Notwithstanding this deviation from the strict technical description of Mr. DAVIDSON, in the subequal areas and partial or entire absence of a ventral deltidium, considered also in connection with the symmetrical form of the shell, I am unable to see any grounds for a separation from authentic forms of STREPTORHYNCHUS.

Pursuing these comparisons among the species of the older formations, we find that some of those described as STROPHOMENA possess many of the important characters of STREPTORHYNCHUS, with the exception that the ventral valve is concave; which, in lesser degree, is true likewise of *Streptorhynchus woolworthana* and *S. pandora*. The *Strophomena deflecta* and *S. deltoidea*, CONRAD; the *S. filitexta*, *S. planumbona* and *S. planoconvexa*, HALL; and *S. sinuata* of DE VERNEUIL, have the ventral foramen partially or entirely closed, and have otherwise externally the characters of striæ of STREPTORHYNCHUS.* The interior of the ventral valve, in two at least of these species, show dental lamellæ of moderate strength, which are continued in an elevated border nearly surrounding the muscular impression. In the dorsal valve of *S. filitexta*, we have a bifid cardinal process as in typical forms of STREPTORHYNCHUS, but scarcely so much developed as in *S. subplana;* while the teeth-sockets are very shallow, and the socket-plates very little developed. The muscular impression of this valve is like that of typical STREPTORHYNCHUS, and unlike that of typical species of STROPHOMENA.

FIG. 5.



When we compare the bifurcating cardinal process of STREPTORHYNCHUS with that of STROPHOMENA,† we find the latter consisting of a double process, or of two toothlike processes, which are inclined inwards, flattened,

* To these may probably be added some other species of resupinate character.

† Taking *Strophomena rugosa* and *S. alternata* as illustrations.

and striated on their exterior faces, but not "grooved or bidentated towards "the extremity of their outer surface" as in STREPTORHYNCHUS. Here again, however, it becomes necessary to distinguish the cardinal process of STREPTORHYNCHUS from that of STROPHODONTA; for the latter is a bifurcating process, and the divisions are bidentate or grooved on their outer face. Aside from the crenulated hinge-line, which is usually a distinguishing feature, the cardinal process of STROPHODONTA is more divaricating than that of STREPTORHYNCHUS, and the extremities of the divisions are thickened; while in the latter, they are often, if not always, more slender, and sometimes flattened towards the extremities. In STREPTORHYNCHUS, the cardinal process is supported laterally by socket-plates, which are often strongly developed; while in typical species of STROPHODONTA, these socket-plates are wanting or rudimentary.

The muscular impressions in the dorsal valve of STREPTORHYNCHUS are more like ORTHIS; while in the ventral valve we have, to some extent, the varieties of form and proportions of muscular impressions observed both in ORTHIS and STROPHOMENA. In one species of Carboniferous age, there is a strong elevated septum dividing the muscular impression of the ventral valve throughout its entire length, becoming thicker above, and, reaching the deltidium at the apex, is conjoined on either side with the bases of the dental lamellæ.

One of the most extreme examples, perhaps, is the *Orthis* (*Streptorhynchus*) *hipparionyx* of the Oriskany sandstone. From external characters, and from the remarkably large flabelliform muscular impression of the ventral valve, it has been regarded without hesitation as an ORTHIS.* It is one of those forms termed resupinate; the dorsal valve being unusually convex, and the striæ curving upwards to the hinge-line in a most extreme degree. The ventral foramen is closed by a deltidium, and the interior of the dorsal valve is furnished with a large bifurcating cardinal process, each division of which is deeply grooved on its outer face, and the extremities bidentate. There is a median ridge of moderate strength and strongly elevated socket-plates, as shown in the accompanying figure.

FIG. 6.

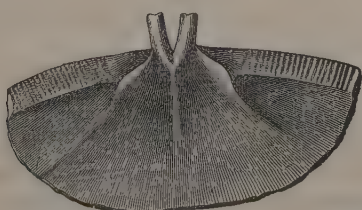


FIG. 6. Interior of the upper part of the dorsal valve of *Streptorhynchus* (*Orthis*) *hipparionyx*: from a specimen of median size.†

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* The Genus HIPPARIONYX, proposed by Mr. VANUXEM, included *Atrypa reticularis* as well as this species.

† For full illustrations of this species, see Palæontology of New-York, Vol. iii. pa. 407, pl. 89 & 90.

After summing up the characteristics of this group of shells, Mr. DAVIDSON remarks : "Such are the general dispositions presented by the "shells composing this subgenus, and which denote its intermediate position "between ORTHIS and STROPHOMENA."

From the observations already made, taking these "*intermediate*" characters for our guide, and adding likewise the Genus STROPHODONTA to ORTHIS and STROPHOMENA in the comparison, it seems to me that the Genus STREPTORHYNCHUS may be much increased in number of species, and a knowledge acquired of its more extended geological range, while its congener STROPHOMENA will be relieved of its present burden of heterogeneous material. The result will tend to more accurate discrimination of those groups which we term genera and subgenera; while at the same time we shall not fail to notice their convergence in certain directions, or among certain forms, and their divergence in others.

In the lower rocks we have a comparatively great variety of exterior form, and of interior development, among those fossils which have been referred to STROPHOMENA; but it is by no means easy to separate these into generic groups. It is only in the higher rocks that we have, as it were coming out of these lower ones, the better defined generic forms of STROPHOMENA, STROPHODONTA and STREPTORHYNCHUS. Taking for our guide the characteristics of STREPTORHYNCHUS as shown in Devonian and Carboniferous forms, we are able to trace the same features, though less strongly developed, in the older species.

Applying these characters, we recognize certain of the latter as apparently more nearly related to STREPTORHYNCHUS than to STROPHOMENA; and we have three types which may be included under that designation. First, those resupinate forms of the Lower Silurian strata, which have bifid cardinal processes directed outwards, and a strongly limited ventral muscular impression. Second, the Upper Silurian doubly convex and plano-convex forms, similar to ORTHIS in external characters, and having a broad flabelliform ventral muscular impression : these extend likewise into Devonian and Carboniferous rocks. Third, the remarkable group with the ventral valve much elevated, the beak bent or distorted, and the muscular impression strongly limited by the extension of the dental lamellæ, and sometimes divided by a strong septum.

These views, resulting from the detailed comparison of parts among these fossils, may perhaps be more philosophically expressed by saying that in the older forms we have the elements, or the partial and rudimentary expressions, which, in later periods, becoming farther developed, afford the means of designating with more clearness and precision the limits of generic and subgeneric groups.

4. NOTE ON THE GEOLOGICAL RANGE OF THE GENUS RECEPTACULITES IN AMERICAN PALÆOZOIC STRATA.

THE original specimens upon which the genus of M. DE FRANCE was founded, are said to have come from the Devonian rocks of Belgium. Mr. SALTER, who has written upon the genus so late as 1859, does not mention its occurrence in the older rocks of Europe; remarking that "it is known in the Silurian strata of Au-" stralia and in the northern parts of the American continent, but " has not yet been detected in the strata of that age in Britain."

The first notice of its occurrence in this country appeared (so far as I know) in the first volume of the Palæontology of New-York, published in 1847; where I referred, with doubt, a species from the Trenton limestone to the European species *Receptaculites neptuni*. The species described by Mr. SALTER is likewise from the Trenton limestone group of Canada.

In the Galena limestone of the Trenton group in the Northwest, there is a large species of this genus of very common occurrence; and in the same rock are three other species. One of these was referred by Dr. D. D. OWEN to the *Coscinopora sulcata* of GOLDFUSS; and a smaller form was figured by the same author, in his Report of 1844, as *Orbiculites? reticulata*, which was subsequently made the type of a new Genus SELENOIDES, showing the views of that writer on the relations of these fossils. Accompanying the Annual Report of Progress in the Geological Survey of Wisconsin for 1860 (published 1861), I have described four well-marked species as occurring in the Galena or Leadbearing limestone, which is of Lower Silurian age; and two species from the Racine limestone, which is of the age of the Niagara limestone of New-York: and I have lately described a third species from Indiana, in strata of the age of the Niagara group.*

I have long known a species in the Lower Helderberg group, which was described by EATON in his Geological Text-book as *Coscinopora infundibuliformis*. The form is oval or subcircular, depressed, concave in the middle, and gradually rising for about two-thirds of the distance towards the margin, when it curves

* Transactions of the Albany Institute, Vol. iv. I have likewise some imperfect and partially crystalline specimens from the upper part of the Cincinnati Blue limestone, which may prove to be of this genus.

more rapidly downwards to the periphery : its thickness, so far as observed, is from one-eighth to about half an inch, with a diameter of three to four or five inches. The pores are smaller than in *R. neptuni*, and nearly the same as in *R. iowensis*.

The species is described by Eaton as follows :

"*Coscinopora infundibuliformis* (funnel net stone). Funnel-forms
" perforated at the bottom : little mouths arranged in the form
" of numerous arcs of circles crossing each other obliquely, by
" having their centres considerably distant. I have a beautiful
" specimen two and a half inches by three and a half, from the
" Greywacke, with the *C. macropora*."

The figures given for illustrating the species offer a very imperfect representation of its characters.

In addition to the preceding, we have a species in the Schoharie grit, which is of the same size as the *R. iowensis*, or larger, and with much larger cells. The form is depressed-orbicular, but frequently not equally developed around the organic centre, which is abruptly depressed. In two specimens before me, one is a regular depressed spheroid, having a lateral diameter of an inch and a half, with a vertical height of three-fourths of an inch ; while the other, an imperfect specimen, measures one inch and a half on one side of the central depression.

It is possible that this may be the *Coscinopora sulcata* of Eaton (Geological Text-book, p. 44) ; but the description "apertures of pores within rhomboidal, without orbicular," is inapplicable to the specimens which I have seen. The aspect of this species is very similar to the figures of Ischadites, Kœniger (Murchison's Silurian System and Siluria, pl. 12, f.), which has been identified with *Receptaculites neptuni* of De France by British palæontologists.

We are therefore able to trace the occurrence of this remarkable genus from the Lower Silurian to the Devonian period, in the following species :

Receptaculites	——— ?	Schoharie grit, Devonian.	
..	*infundibuliformis*, Eaton :	Lower Helderberg group.	UPPER SILURIAN.
..	*infundibulum*, Hall :	Niagara group.	
..	*hemisphericus*, ..	.. ..	
..	*subturbinatus*, ..	.. ..	

Receptaculites oweni, HALL:	Galena limestone.	LOWER SILURIAN.	
.. *iowensis*, OWEN:	.. ..		
.. *fungosus*, HALL:	.. ..		
.. *orbicularis*, ..	.. ..		
.. *occidentalis*,* SALTER:	Trenton limestone.		

The species in the Leadbearing limestone of the Northwest, particularly the *R. oweni*, have the widest geographical range of any known to me. The species in the Niagara group appear to have very limited geographical range, and are of comparatively rare occurrence. Those of the Lower Helderberg group, and Schoharie grit, are known to me only within a very moderately extended area.

It is probable, however, that these fossils, which are often not conspicuous, and which sometimes appear like worn or weathered corals, have not attracted the attention of collectors. Still I am much inclined to the opinion that they will rarely be found to have a wide geographical range, and that only at distant points have the conditions been favorable for their full development. Under certain circumstances, some species have been very prolific; and in the limestone of Iowa, at the junction of the Trenton beds proper with the Leadbearing limestone, the thin layers of rock are sometimes crowded with the broad discs of *R. oweni*, while in a locality near Dubuque the *R. iowensis* is crowded together in great numbers.

5. NOTE ON THE OCCURRENCE OF ASTYLOSPONGIA IN THE LOWER HELDERBERG ROCKS.

In the very beautiful and valuable contribution to American Palæontology, "Die Silurische Fauna des Westlichen Tennessee," Dr. RŒMER has described six species of SPONGIÆ from the Silurian strata of Tennessee. These are the *Astylospongia præmorsa*, *A. stellatim-sulcata*, *A. inciso-lobata*, *A. imbricato-articulata*, *Palæomanon cratera*, *Astræospongia meniscus*. All of these species I have had in my collections from Tennessee since 1850.

The *A. præmorsa* likewise occurs in Europe, and therefore has a wide geographical distribution. Notwithstanding the common occurrence of several of these species in Tennessee, together with CARYOCRINUS and other fossils of the age of the Niagara group, I have not seen a specimen of either species in the rocks, nor in any

* I have still some doubt whether the one which I referred to *R. neptuni* may be identical with this species of Mr. SALTER.

collection from the Niagara group of New-York, or of Iowa, Wisconsin or Northern Illinois.* Among some collections made in 1860 & 61 from Waldron, Indiana, a single species, the *Astylospongia præmorsa*, occurs in considerable numbers; but the specimens are much smaller than most of those in my collection from Tennessee. In the same association with this species are numerous known species of the age of the Niagara group, including one Crinoid, several Brachiopoda, and Crustacea.

I have had in my collection, for many years, a species of Astylospongia from the Lower Helderberg group. It occurs chiefly in the shaly calcareous layers, but is sometimes found in the limestone. The form is globose or subglobose; some of the specimens being a quarter of an inch in diameter, and others having a diameter of an inch and a half, and perhaps more. The surface is without ornament, being neither lobed, striate nor sulcate; though from the point which appears to be the base, there are, in well-preserved specimens, sometimes a few indistinct radiating lines.

These bodies are frequently encased in a shaly coating; and the structure being obscure, they have doubtless often been neglected, under the impression that they are small corals with a shaly coating obscuring the cells, or that they are spherical concretions, which they much resemble. In the weathered and partially decomposed specimens the exterior structure is well displayed, and a transverse section exhibits the characteristics of other species of the genus.

This species may be designated the *Astylospongia inornata*, from the absence of external ornament or marking, and which will distinguish it from any of those cited above.

This species is of common occurrence at the Helderberg mountains and at Schoharie.†

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* It is possible that some of the small spheroidal bodies in the Niagara shale, which are usually decomposed by the presence of sulphuret of iron, may belong to this group of fossils.

† To those who have facilities of studying with the microscope, these spheroidal concretion-like bodies offer inducements for investigation. The more calcareous ones display structure without preparation; while the silico-calcareous ones require to be macerated in acid, after cutting or grinding the surface. It is quite probable that a more critical examination may disclose the occurrence of similar bodies in some portion of the Niagara group or Coralline limestone.

6. ON THE OCCURRENCE OF CRUSTACEAN REMAINS OF THE GENERA *CERATIOCARIS* AND *DITHYROCARIS*,

WITH A NOTICE OF SOME NEW SPECIES FROM THE HAMILTON GROUP AND GENESEE SLATE.

[With a Plate.]

THE interest attached to the fossil remains of CRUSTACEA other than those of TRILOBITES, in the palæozoic rocks, has within a few years been greatly increased by the discoveries in Great Britain and the elucidation given by Messrs. HUXLEY and SALTER, and more recently by the papers of Mr. SALTER in the Quarterly Journal of the Geological Society of London. In a late number of this Journal, Vol. xix, Part 1, some species are described from the Coal measures and Devonian rocks of British North America, as well as from the Carboniferous rocks of Great Britain.

Up to this time, our knowledge of these Crustaceans is chiefly confined to the Genera EURYPTERUS, PTERYGOTUS and CERATIOCARIS, from the Waterlime group; with a few fragmentary specimens from some rocks below, and others from those directly above that formation. These are all of Silurian age; and the strata of Devonian and Carboniferous age, within the United States, have hitherto furnished but meagre and unsatisfactory materials.

I have for a long time known of the existence of some fragments of DITHYROCARIS from the Hamilton group, and more recently have obtained other fragments which seem referable to the Genus CERATIOCARIS. My collections, however, are so imperfect, that I would have deferred any notice of them for the present, but for the hope that publicity might attract the attention of collectors and others to the subject; by which means we may become better acquainted with the geological and geographical distribution of these crustaceans, and thus obtain materials for their complete illustration in the volume on the Palæontology of the State.

The materials before me are chiefly the following:

1st. Several fragments from the shales of the Hamilton group, one of which is the tail-joint and appendages: another consists of several joints of the abdomen, with the tail and appendages; while another preserves the half, or one valve of a strongly marked carapace.

The two first mentioned specimens are from the same locality, presenting similar characters, and are apparently referable to a single species of CERATIOCARIS. The carapace presents a different texture and surface-marking,

and is referable to a very distinct species, and perhaps to a distinct but allied genus.

2nd. The other specimens are from the Genesee slate, and consist of a small specimen preserving two joints of the abdomen and a part of the tail-appendages of a CERATIOCARIS, together with numerous specimens of the detached caudal appendages which are sometimes thickly scattered over the surface of the laminæ. These specimens, in one locality, indicate the former existence of great numbers of these animals; but unfortunately they are so macerated and compressed, that their examination affords very unsatisfactory results.

3rd. A large slab from the Hamilton group, obtained many years since from Otsego county by Mr. SIMS, and now in the State Museum. On the surface of this slab are the impressions and remains of the tail-joint and appendages of at least four individuals of a large species of DITHYROCARIS. The fifth impression may have been of a displaced portion of one side of the others, since the stone is so broken as to have lost the greater portion of one side of one specimen.

GENUS CERATIOCARIS (M'COY).

CERATIOCARIS ARMATUS (n. s.).

PLATE I. FIGS. 1, 2, 3.

A fragment consisting of the three posterior joints of the abdomen and a part of the next anterior or second joint, together with the triple spine of the tail. These articulations are somewhat slender but strong, thickened at their anterior articulating edge upon the back, while the dorsal posterior margin is thickened and furnished with four strong short curved spines projecting over and protecting the joint: the second or most anterior articulation has three spines on each side of the centre. On the under surface (the fragment being nearly straight), the crustaceous articulating faces are widely separated; the posterior margin thickened and curved outwards for the reception of the anterior callosity, showing an arrangement for extreme flexure or incurving of the body. The last joint is short and stout, broader in the middle than the next anterior one. The central portion becomes subangular, and is extended in a strong spine. On each side of the base of this spine, it is depressed; the lateral portions, becoming expanded, are obliquely truncated behind, and to these faces the lateral spines are articulated. The lower surface is nearly flat, slightly concave in the middle, and the anterior margin elevated in a strong condyle. The lateral spines are somewhat flattened and grooved below, and abruptly rounded above. The form of the lower part

of the body has been nearly cylindrical, very gradually tapering, and the crust is finely granulose.

The three last joints, to the base of the tail-spines, measure nearly an inch and three-fourths. The tail-spines are imperfect at their extremities, one of the lateral ones preserving an inch and a quarter of its length. The lateral diameter of the third joint, in its crushed and flattened condition, is less than half an inch, with a vertical diameter of a quarter of an inch.

In a smaller specimen of the caudal joint and appendages, the lateral spines are a little more than an inch and a half in length, the central one being a little shorter.

Fig. 1. The lower side of the abdomen and caudal spines.
Fig. 2. The upper or dorsal side, showing the short spines on the posterior edge of the articulation.
Fig. 3. The tail-joint and appendages of another individual.

The specimen first noticed is the first one observed in which the entire characters of the body-joints could be ascertained. The fragmentary specimens heretofore seen have been so completely flattened as to show no form of the articulating faces, or the defences of the joint which are so beautifully preserved in this one. The specimens heretofore observed in our rocks have furnished no means of ascertaining the entire character of the tail-spines, or their mode of attachment. In this example, the central one appears to be a prolongation of the last joint of the body, while the lateral ones are articulated appendages.

This species has been found in the shales of the Hamilton group in Ontario county. In the collections made by Dr. C. A. White and Mr. R. P. Whitfield.

CERATIOCARIS LONGICAUDUS (n. s.).

PLATE I. FIGS. 4-7.

The fragment of the abdomen is extremely flattened; the joints longer than wide, and proportionally longer than those of the preceding species. The caudal spines are imperfect, but appear to have been obtusely triangular in their original condition.

Detached spines of similar character are found in considerable numbers, varying from two to three inches in length, and some of them have been longer.

Fig. 4. A fragment showing the posterior joints of the abdomen and tail-spines.
Figs. 5, 6 & 7. Detached spines found in association with the preceding, and apparently belonging to the same species.

These remains occur in the black and thinly laminated upper part of the Genesee slate, in the south part of Ontario county. The specimen figured is the only part of the body yet observed. From the collections made by Mr. R. P. Whitfield.

CERATIOCARIS? PUNCTATUS (n. s.).

PLATE I. FIG. 8.

The half of a carapace, having the aspect of one valve of a monstrous LEPERDITIA. The form is ovate, broader and rounder at the posterior end, and without any apparent articulating face for the abdominal joints. Surface strongly and deeply punctured or pitted, with an aspect like shagreen. A strong node-like process exists on the dorsal margin; and towards the anterior end are two large low prominences, with two less elevated ones in front of these, beyond which the surface is irregular.

This fragment is referred with hesitation to the Genus CERATIOCARIS, both on account of its nodose surface, which has not been observed in any of the other species, and chiefly from the peculiar punctured or granulose-punctate texture of the crust.

At the present time, no other specimens pertaining to this species are known.

From the collections made by Dr. C. A. WHITE on the east shore of Cayuga lake.

Comparing the typical forms of the genus as given by Professor M'COY, and those already known from our Upper Silurian rocks, there may be some doubt whether any of these here noticed are true CERATIOCARIS. With the meagre materials before me, I have not thought it desirable to propose any separation from that genus at the present time, particularly since there is a generic designation already proposed by Mr. SALTER for an imperfectly known Devonian form. When the Genus DICTYOCARIS shall be fully known and described, we may be able to determine whether some of these fragments pertain to that genus.

GENUS DITHYROCARIS (SCOULER).

The fossil remains which I have referred to this genus consist, as before remarked, of the tripartite caudal appendages; and at this time, no other remains referable to this genus are known in any of the New-York strata.

DITHYROCARIS NEPTUNI (n. s.).

PLATE I. FIG. 9.

The caudal portion, consisting of a strong condyle with its appendages, is represented on Plate I. The anterior extremity is a little concave in the centre, rounded at the antero-lateral angles, and very prominent in the middle above. The central portion, in its posterior extension, is a little depressed on each side, with an elevation in the middle, and becomes prolonged into a triangular spine; the upper central angle rounded, the spaces between this and the sharp lateral angles being slightly concave. On each side is a stronger and much longer lateral spine, which is united by an oblique suture which extends from the posterior junction of the central spine to the margin, halfway to the anterior extremity.

These lateral spines are broad at the anterior extremity, flattened on the lower side, and nearly flat above, except towards the inner lateral edge, when it is slighly angulated, the inner margin being very thin. These spines gradually taper to an acute point, the extreme length to the anterior face of the condyle being about five inches and a half. The surface is lamellose-striate; the striæ upon the lateral spines being directed obliquely outwards, and are stronger towards the margins.

This genus is known in rocks of Carboniferous age in Europe, and its occurrence in lower beds in this country would only accord with other facts of like significance. Notwithstanding the difference between the specimens illustrated, and those figured by British authors, I conceive there is no dissimilarity of generic importance.

The fossil occurs in a sandy shale; and the small slab of nine inches in width by about fifteen inches in length contains the remains of four or five individuals, showing that in the neighborhood of this locality the animal was not rare. The impressions of these bodies in the stone are chiefly what remains of them, and they all lie in the same relative position regarding the upper and lower surface. The deep rounded cavity made by the strong anterior extremity has unfortunately been "*artificially completed*," so that I cannot have so clear an idea of its form. The figure has been made from a cast in one of these impressions, and no restoration has been attempted, the engraving having been carried as far as portions of the crust could be discovered.

FIG. 9. *Dithyrocaris neptuni* : the caudal joint and tail-spines, from a cast of the cavity left in the stone by the decay of the fossil.

The specimen is now in the State Museum of Natural History.

7. OBSERVATIONS UPON SOME SPIRAL-GROWING FUCOIDAL REMAINS OF THE PALÆOZOIC ROCKS OF NEW-YORK.

In the higher groups of the Palæozoic rocks of New-York, and of Ohio and Pennsylvania, there are numerous organic remains which have been referred to "Fucoides;" a term which is often applied to all forms of marine vegetation, or of bodies which have apparently a vegetable origin, but, preserving no fibrous or woody texture or carbonaceous film, are supposed to be of marine origin, and to have grown like the modern fuci. Since we suppose these remains to have been attached to the bottom of the sea during the accumulations of the sediment, and since their substance is scarcely separable from the stony matrix, it is evident that the presentation of these bodies upon the successively exposed layers may not always reveal their entire form and character. It is true that they may have been broken and drifted about like the land plants; but their texture has not enabled them to resist the action of the waves, and we usually find but unsatisfactory fragments, and of many of these I believe the original form has not been understood.

In the present remarks, I intend to refer only to those spreading forms which have been termed, by Dr. Locke in the Ohio Geological Report, "*Curtain fucoids;*" and similar forms described by Mr. Vanuxem under the same name, and also as the "*Retort fucoid,*" the "*Fucoides cauda-galli,*" etc.

The *Fucoides cauda-galli* appears to have been the earliest of these peculiar forms. This species, when approximately entire, presents on the surface of the rock a subcircular or oval form, often more or less distorted, but with a subcentral depression if viewed from the upper side, and a corresponding elevation if seen from the lower side. The disc appears to be made up of fascicles which radiate in curving lines from a common centre, and are frequently not distinctly limited on the outer margin. Although these fascicles seem scarcely connected, it seems probable that the form is given by a continuous disc which is thickened in some parts, and these thicker portions give character to the frond.

The similarity between this species, which has given the name to a formation, and those which are so abundant in some parts of the Hamilton group, is very obvious. Mr. Vanuxem has already made this comparison, and says :

"The singular and graceful forms first noticed in the Cauda-galli grit
" reappear in this group, and are common to many localities. The forms
" are better defined in this rock than in the lower one, and the parts are
" all united or confluent; showing, in other words, a continuous surface,
" and not one of detached parts either real or apparent, as in those of the
" other rock."*

Similar forms occur in the Chemung group of New-York and Ohio, all presenting the peculiar character of surface, viz. a curvilinear outer margin, sometimes a little thickened, to which all the parts are directed from a common centre, in curving lines; for however even may be the surface of the frond, there are either thickened portions or curving striæ, which show the direction and mode of growth.

I have had in my collections, for a long time,† specimens which illustrate the mode of growth, and to some extent the perfect form of these peculiar fossils in at least one species.

The form has been that of a spiral frond, growing upwards from a small base, and gradually expanding in its successive volutions. The axis is sometimes, and perhaps always, thickened; and portions of this, when torn away with broken parts of the frond, give the aspect of a "stem," as spoken of and illustrated by Mr. Vanuxem. I have ascertained this mode of growth and form of the fossil, by separating successive laminæ of the shale, and tracing the continuation of the same frond upwards as it appears in the enlarging discs upon the successive surfaces. In this manner they have been traced from where the diameter is less than one inch, and apparently near their origin; and thence through the gradually expanding volutions till they have reached the diameter of several inches, the spaces between the volutions being several times greater than the thickness of the frond. The volutions and the form of the disc often, and perhaps usually, continue very regular till the turns have reached a diameter of four or five inches; while the larger fronds not unfrequently present irregularities and distortions, both from unequal growth and from accident, evidently having been very flexible and easily disturbed.

From the character of the fragments occurring in association with the regular spiral forms, it would appear that the upper portion of the frond often grows more freely, or more rapidly ascending; having the appearance of a broad band irregularly contracted into festoons.

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* Geological Report of Third District N.Y. Survey, p. 156; figures pp. 160 & 177.

† Since 1838.

These expansions consist of two thin films, which, even in their compressed condition, are found to be separated by a filling of shaly matter; and in some of the larger ones, this interspace appears to have been filled with small shells, or fragments of shells, of the Genus Ambocœlia, reminding one of the spiral sacs of Pyrula.

These bodies have grown only in quiet positions, as proved by the fine shaly and slowly deposited matter which envelops them. After examining many of the fragments, which present a great variety of form and proportions, the conclusion is inevitable that they have all grown as here described, and that these large and variously shaped remains are either the higher and last growth which has not maintained the circular form, or that they are detached portions which have been distorted by pressure after their separation.

The term Fucoides, which is applied to these as well as to other very dissimilar bodies of marine origin, should give place to some more definite and distinguishing term; and I would propose the name Spirophyton.

GENUS SPIROPHYTON (n. g.).

Fossil marine plants, consisting of broad, thin, striated or fasciculate, ridged or corrugate fronds or discs, which grow in a spiral form, and increase by the extension and expansion of the frond in a spirally ascending direction.

These fronds, in single detached volutions, present a concave upper surface, with a corresponding convexity of the lower surface, and usually a little thickened at the central axis. The surface is finely striate, wrinkled, or fasciculate; the outer margin strictly defined, or irregular in the different forms. The degree of concavity of the spiral, as well as the superficial character, varies in different species.

The fossils of this type are remarkably characteristic of the Devonian strata, or of those groups beginning with the Upper Helderberg, and including all the intervening strata to the Carboniferous system; and they may likewise exist above and below these limits.*

From the materials before me, I am able to recognize the following species:

* I have a well-marked species of the genus from a short distance beneath the Coal conglomerate of Ohio.

SPIROPHYTON CAUDA-GALLI.

Fucoides cauda-galli : VANUXEM, Geological Report Third District, p. 128.

GENERAL form circular, often irregular, the outline undefined. The ridges or fascicles, curving gently from the centre, are more abruptly bent towards the margin; and being stronger near the centre, have a fanciful resemblance to the feathers of a cock's tail, from which the name has been given.

This species is so extremely abundant, that it often covers large surfaces of the rock; and lying so closely together that the outlines are usually destroyed, it is difficult to procure good specimens, or those which show the entire form of the frond. The larger discs often reach a diameter of more than a foot; but from the peculiar texture of the rock, the successive volutions have not been traced.

The specimens figured by Mr. VANUXEM illustrate the prevailing characteristics of the species on a small scale.

FIG. 1.

FIG. 1, illustrates the ordinary character and aspect of this fossil.

Fig. 2, is a distorted portion of the last volution, preserving a well-defined outline.

SPIROPHYTON TYPUM.

PLATE II. FIGS. 1, 2, 3.

Frond spiral, slowly ascending, with six or more volutions, somewhat rapidly expanding at each turn of the spire. Frond thin: surfaces striated or finely wrinkled, sometimes grooved parallel to and near the outer margin, with the periphery thickened. Spaces between the volutions three or four times greater than the thickness of the frond.

Surfaces of the discs deeply and abruptly concave near the centre, and slightly concave or sometimes nearly flat on the outer half: margins clearly defined.

Fig. 1. Upper side of the frond, at about the sixth or seventh volution from the base. The dark line of shadow from the centre to the lower side indicates the thickness of stone intercalated between two of the volutions.

Fig. 2. A transverse section of the same individual, about two volutions lower; looking upon the lower side. There is a shallow groove and slight thickening of the periphery.

Fig. 3. A partial restoration of a frond of this species, derived from the examination of specimens similar to figs. 1 & 2.

SPIROPHYTON VELUM.

Fucoides velum : Vanuxem, Geological Report, p. 176; figs. 391 & 160.

This species appears as irregular expansions like the one figured by Mr. Vanuxem. The surface is marked by undulating ridges, which become stronger on the sides, and are not entirely parallel with each other or with the outer margin; each one having been at one time the exterior limit of the frond, which changes the curvature of its outline in its advancing growth.

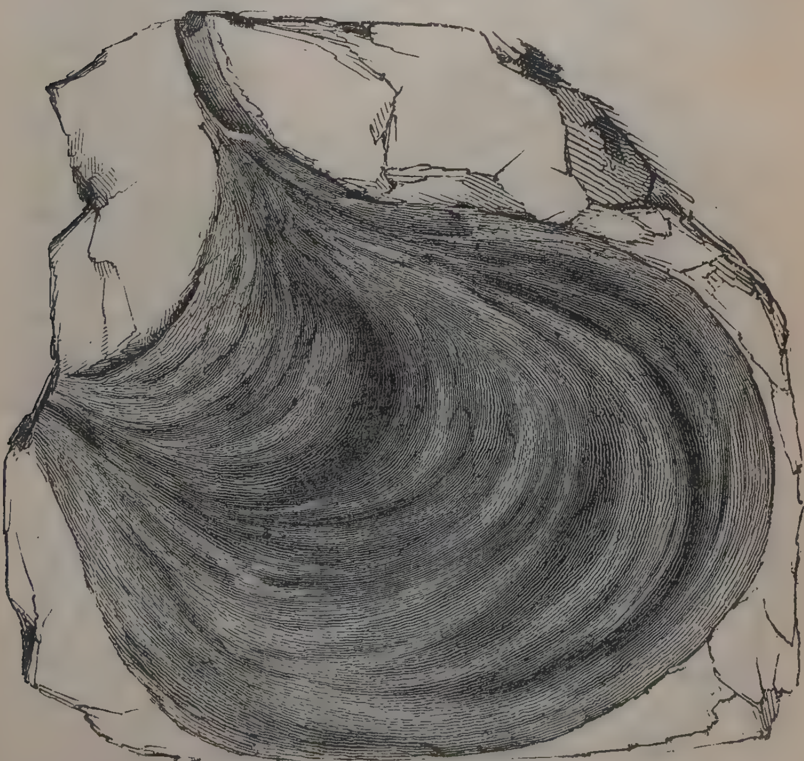
These forms, and the great variety which are observed all approximating this one, appear to have been the growth of the frond above the more regularly spiral portion, where the axis, becoming more free and rapidly ascending, has permitted these irregular expansions of the parts.

Forms like this one are of common occurrence in the arenaceous shales of the Hamilton group in Otsego and Madison counties : they are less conspicuous in the softer calcareous shales of Cayuga, Seneca and Ontario counties.

The regular spiral portion of the frond of this species has not come under my observation in the localities where these specimens were obtained ; but a similar or identical species, in regular form, occurs in the same position in Schoharie county.

I should not omit to observe that with the *S. typum* in the softer shales are similar irregular expansions, but of less vigorous growth than those here noticed. Nor is it impossible that the differences of condition, and of the sediment, may have produced in a single species those modifications which I am at present compelled to recognize as specific differences.

FIG. 3. *Spirophyton velum* : VANUXEM.



The specimens designated by Mr. VANUXEM the "*Retort fucoid*," are clearly parts of the spiral forms already described, but growing irregularly so as to give a greater expansion on one side; or from pressure on the opposite side, that part of the frond has been contracted or crushed.

The annexed figure from the Report of Mr. VANUXEM, when compared with those on Plate 2, will show the same or a similar mode of growth.

FIG. 4.

SPIROPHYTON CRASSUM (n. s.).

PLATE II. FIG. 4.

Frond spiral; disc abruptly depressed towards the centre, and less concave towards the outer margin. Substance of the frond ridged, radiating from the centre in fasciculi which expand and curve towards the outer margin, where the surface becomes more even: margin distinctly defined.

This is a strong growing species, which attains a large size. In a specimen about five inches in diameter, the margins of the volutions are separated by a little more than half an inch of intercalated stony matter, while the convexity of the volution is nearly an inch.

The species occurs in greenish gray shaly sandstone below the Carboniferous conglomerate at Cuyahoga falls, Ohio.

I have a very similar species from the Chemung group of New-York, which differs in having the ridges or fasciculi more sharply defined upon the upper surface of the frond, which is nearly flat till within an inch of the centre, where it is suddenly depressed. The specimen is imperfect, but the single disc before me has been, when entire, at least eight inches in diameter.

The preceding forms are illustrations of a natural and very peculiar group among the numerous forms of marine vegetation, which abound in some of the Upper Palæozoic rocks of New-York and the adjoining States. Their interest consists, not more in indicating a peculiar group, than in the fact that, so far as at present known, they characterize formations of a certain age, beginning with the base of the Upper Helderberg group, and marking those strata which we have regarded as of unequivocal devonian age. In this respect, their occurrence may be found of advantage elsewhere, as indicating strata of similar age.

In other regions, however, where the line between Devonian and Carboniferous is not so well defined as in New-York and to the westward, these forms may be found to have a greater vertical range; and I have not at present evidence for asserting that they do not occur in the Lower Carboniferous shales of Pennsylvania.

The object of this short notice will have been accomplished, if it induce observation upon the mode of growth, nature, and geological range of those peculiar forms.

8. OBSERVRTIONS UPON THE GENERA UPHANTÆNIA AND DICTYOPHYTON;

WITH NOTICES OF SOME SPECIES FROM THE CHEMUNG GROUP OF NEW-YORK, AND THE WAVERLY SANDSTONE OF OHIO.

The remarkable fossils which have been illustrated and described under the names "Hydnoceras" and "Uphantænia", would not, from the illustrations given, be supposed to possess very intimate relations; but an examination of several forms, which are clearly referable to the same natural group with the former, has led me to suspect that the Uphantænia may be included among them.

We cannot suppose that bodies like the Uphantænia of Vanuxem are animal remains; and the Hydnoceras of Conrad, and allied forms, show no shell or crust or other indication of animal origin. We infer, therefore, from numerous observations, that they may belong to some peculiar marine vegetation.

These remains are usually casts in sandstone, though sometimes preserving the exterior markings; while in many instances they consist of impressions of the exterior preserved in the rock, and though occurring in the same beds with land-plants, never preserve the carbonaceous coating common to the latter. From this fact, and from other circumstances, we are led to infer that they belong to the marine vegetation, and that they are Algæ of a peculiar form and mode of growth.*

The original specimen described by Mr. Conrad in the Journal of the Academy of Natural Sciences,† is an inverted-subconical, nodiferous body, with reticulate surface-marking, produced by slender, radiating and concentric striæ.

The specimen is from sandstone, in Steuben county; and several others have been obtained from the same region, none of them more complete than the one first described. I have also seen, in the Museum of the Academy of Natural Sciences of Philadelphia, a fragment four inches or more in diameter, the section having a subquadrate form.‡

The original specimen from which the Genus Uphantænia was described is a flabellate frond, representing nearly a quarter of a circle, but imper-

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* In some specimens from Ohio, which occur among fragments of land-plants, there is sometimes an adhering film of minute fragments of carbonaceous matter; but I regard these as having been derived from broken and drifted land-plants.

† Vol. viii, p. 567 – 8, 1842.

‡ The form and dimensions are given from recollection after many years.

fect in some of its parts. The specimen gives no indication of having grown in any other form than a circular, slightly concave disc. The centre, point of attachment, or stem, is unknown. It is an impression in the stone, consisting of radiating and concentric bands. The rays, near their origin, are less than a line in width, and, at the distance of six inches, are a little more than a quarter of an inch in width; some of them gradually narrowing towards their outer extremity. They are not striated or marked in any manner, the edges of the impressions being slightly raised. The concentric bands are simple and contiuuous, not striated or otherwise marked, and are slightly raised at the margins. Those near the origin of the rays are less than a line in width, and each successive one becomes a little wider; so that the outer ones have about the same width as the rays in their widest part. The rays are not equidistant, and some of them show a slight curvature throughout nearly their entire extent. In the portion of the disc preserved there are nine rays and the marks of twenty concentric bands, and there were probably two or three more between the inner one and the centre. The interspaces between these parallel bands and the rays are sharply quadrangular, being of the same width or wider than the bands near the centre, becoming proportionally less until near the margin, when they are not more than half the width of the parallel bands. In the lateral direction, the spaces increase rapidly on receding from the centre.

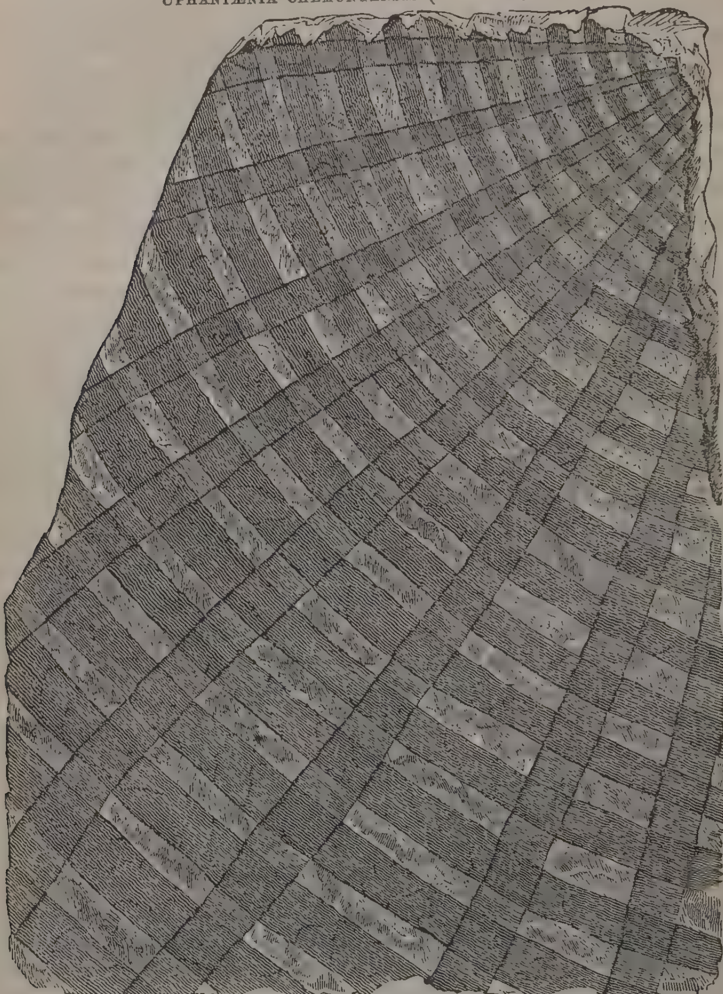
This specimen has an unusual and very artificial appearance. The regular flat bands essentially parallel with each other, with similar radiating bands, mark the limits of the organic substance; while there are regular interspaces where there is no organic marking, showing the want of continuity in the investing substance. All this renders it difficult to give any plausible explanation of its mode of growth. It is possible that the apparently parallel bands are a continuous spiral band; but there is no evidence of this in the fragment, nor can it be positively asserted that the entire form was circular: it may have been broadly flabelliform, with a stem or footstalk.

The most remarkable feature is the want of continuity in the frond, since both the radiating and parallel bands are distinctly limited, showing no evidence whatever of any organic substance or marking in the intervals. In this respect, all the other forms which I have seen, and with which this may be regarded as allied, differ in a conspicuous manner. In the specimen fig. 2, Plate iv, we have a cast of the interior of a funnel-shaped frond, which is sharply striated both radiatingly and concentrically; but there are no interspaces which do not bear evidence of organic impressions.

In fig. 1, which I regard as the exterior of the same species, the substance of the frond is everywhere continuous, and the stronger radii do not appear to be so conspicuous on the exterior as upon the interior. In the surface-markings of fig. 2 we have a close similarity with the surface of the original of HYDNOCERAS, and the analogy is farther confirmed by intermediate forms illustrated on Plates IV, V & V A.

The accompanying figure from the Report of Mr. VANUXEM illustrates the greater part of the only known specimen of UPHANTÆNIA, and presents every character of importance.

UPHANTÆNIA CHEMUNGENSIS (Vanuxem).



In the typical species of the genus, figured by Mr. CONRAD, we have an elongate subconical body with a reticulate surface and several rows of nodes, which are longitudinally angular, and connected by an angular ridge extending between them.

From analogy with the associated forms in the same strata, I consider these bodies to have grown from the smaller extremity; enlarging upwards, and growing in cylindrical or obconical hollow stems, which may have expanded above into flabellate fronds.

The Genus Uphantænia may be characterized as follows :

GENUS UPHANTÆNIA (Vanuxem).

Circular or flabellate fronds composed of ligulate radiating and concentric bands, the reticulations being produced by the substance of the frond, and not caused by superficial striæ.

The entire form is unknown.

The only species known is the *Uphantœnia chemungensis* of Vanuxem.

For the obconical or subcylindrical stems, with or without flabellate fronds, I propose the name Dictyophyton, from the cancellate surface of all the known species.

GENUS DICTYOPHYTON (n. g.).

Flabellate or infundibuliform fronds with reversed conical or cylindrical hollow stems, marked externally by cross striæ which divide the surface into minute rectangular spaces.

In many species there are two sets of striæ, a coarser and more distinct set, with finer intermediate ones. Stems usually a little spreading at their bases, sometimes contracting above, and then spreading in flabellate or funnelshaped fronds.

Types : *Dictyophyton newberryi, D. filitextile* & *D. redfieldi.*

In some of the species, the surfaces of the stems are angular ; others are nodose or annulated. The casts of the interior present a similar striated surface with the exterior.*

DICTYOPHYTON NEWBERRYI (n. s.).

PLATE IV. FIGS. 1, 2 & 3.

Stem subconical, apparently fibrous below, gradually enlarging above and expanding into a broad spreading funnelshaped frond. Surface marked by strong radiating and concentric striæ, which divide the surface into rectangular spaces, and between these are finer sets of striæ which cancellate the spaces between the coarser ones.

In several specimens before me, this species does not exceed a height of four or five inches ; while the diameter of the frond, when fully extended, would be nearly as great. Numerous stems and fragments of stems, possessing the same general features, indicate the existence of fronds several times larger than the one figured.

* Notwithstanding the objectionable name Hydnoceras, I would not have proposed to change it, but to restrict its application to such forms as the original, which would include *D. (H.) tuberosum* and *D. (H.) nodosum;* while Dictyophyton might have included the other forms. But at the request of Mr. Conrad, I have dropped the use of the term Hydnoceras, and have extended the definition of Dictyophyton to include those forms.

I am indebted to Dr. J. S. NEWBERRY for the cast, specimen figure 2, which was collected in the vicinity of Cuyahoga falls, from whence I have many years since (1841) obtained numerous fragments of the same.

The more perfect specimen which I have referred to this species, was collected by Dr. C. A. WHITE, at Richfield, Ohio, in rocks of the same age.

The large stipe, fig. 3, Plate iv, is from the same beds as fig. 1; and from its exterior markings, I infer that it is a larger individual of the same species. The upper part of the stem is gradually expanded, and the broken margin indicates its relation to the spreading frond above. The entire length of the fragment is six inches, which, with the same proportions as the smaller ones, would give the entire plant more than a foot in height.

This species is the most common form known to me at this time. Fragments of the spreading frond are common at Cuyahoga falls, and stems and fragments of stems are of frequent occurrence at Richfield, Ohio, from whence it was first brought by Dr. G. M. KELLOGG.

DICTYOPHYTON FILITEXTILE (n. s.).

PLATE IV. FIG. 5.

AN impression of the hollow stem in sandstone presents a regularly cancellated surface; the striæ are sharp linear, and in three degrees of strength, every fourth one being more deeply impressed or stronger than the others, while the central intermediate one is stronger than the adjacent two. In the longitudinal direction there is a slight angularity, or greater prominence, at regular intervals of every eighth stria.

The figure is drawn from a cast in the natural mould. In the same piece of stone is a second fragment of a character similar to the one illustrated.

The stem appears to have been more uniformly cylindrical, and the striæ are sharper than in the stems of *D. newberryi*. The substance of the stem was apparently very delicate, and nothing is known of the upper portion of the frond.

Geological formation and locality. In the Chemung group of Steuben county, N.Y.

DICTYOPHYTON REDFIELDI (n. s.).

PLATE V, FIG. 1; PLATE V A, FIG. 1; AND PLATE IV, FIG. 6,

THE large hollow stem has a spreading base, and is gradually contracted to a little above the middle of its length, where it is more expanded into a broad somewhat funnelshaped frond, the full extent of which is not known. Surface cancellated by fine, almost even, threadlike striæ; while on one side there appears to have been, at regular intervals, stronger transverse striæ with finer intermediate ones, but no indications of stronger longitudinal striæ.

This species is large and of strong growth, but its full dimensions are not known. The specimen figured is apparently nearly entire at the base, and we see the whole extent of the stem. It has been thrown down on one side, and the side which was below is nearly continuous with the stem, expanding only at the sides. On the upper lateral portions the frond is abruptly expanded from the stem; while the central upper line shows the frond to be longitudinally slit open either naturally or artificially, and the margins recede from the central line as shown in the figure 1, Plate v. The expanded frond is again folded inward, one side overlapping the other, and its continuation above is broken off. The slit has the appearance of having been natural, the margins being neatly defined. If this were true, the form of the frond may have been broadly palmate-funnelform below; and it may have extended in a broad ligulate expansion above, after the manner of some of the modern ALGÆ.

PLATE V, Fig. 1. The upper side of the specimen as imbedded in the stone, showing the divided frond above the stem, and the infolding of the sides.

PLATE V A, Fig. 1. The opposite side of the same specimen; the top of the frond broken off.

This species is distinguished from the others in the fragments of stems, by the nearly uniform striæ; and from the larger stems of *D. newberryi*, by the absence of the stronger radiating and concentric striæ, and by a greater expansion at the base of the stem; while the upper part of the frond is equally distinguishable by the character and size of the striæ.

The specimen figured was collected near Harrisville, Medina county, Ohio, from gray shaly sandstone, by the late W. C. REDFIELD, and first placed in my hands in 1849. It was subsequently returned to his collection, and has again been kindly loaned to me by C. B. REDFIELD, esq. of Albany. In the mean time, I have obtained, through Dr. G. M. KELLOGG, and from the collections of Dr. C. A. WHITE, fragments of stems and fronds, of the same species, from Richfield, Ohio; but these add very little information to that already derived from the original specimen.

PLATE IV, Fig. 5, is a fragment of a stem of the same species, associated with *D. newberryi* at Richfield, Ohio.

DICTYOPHYTON CONRADI (n. s.).

PLATE V, FIG. 2; AND PLATE V A, FIG. 2.

BODY reversed pyramidal, oblique or slightly curving, and expanding from the smaller extremity (base); regularly octangular, with the intervening spaces flattened or slightly concave. Surface cancellated by fine threadlike striæ, with a stronger depressed concentric line at every ten or twelve of the fine striæ, and the angles are marked by a more distinct longitudinal groove, as also the centre of the flattened spaces. At the larger extremity on the exterior curve, the surface has the appearance of becoming nodose. Longer and shorter diameters about as two to three.

The figures are two-thirds the natural size; one a lateral view, and the other a view upon the longer side or outer curve.

I am indebted to Hon. SAMUEL EWING, of Randolph, Cattaraugus county, for this beautiful species.

DICTYOPHYTON RUDE (n. s.).

PLATE V. FIG. 3.

A STRONG flattened stem (not unlike fig. 3 of Plate iv), with coarse elevated cancellating ridges and intermediate longitudinal and transverse fine striæ.

The fragment is compressed, having a length of five inches with a diameter of two and a half inches. In the evenness of the finer intermediate striæ, and the greater strength of the coarser ones, it differs from the stems referred to *D. newberryi*.

The figure represents a small portion of the surface.

Formation and locality. In the Chemung group, at Little-Genesee, Allegany county, N.Y.

DICTYOPHYTON FENESTRATUM (n. s.).

PLATE III. FIG. 4.

For description, see the Explanation of the Plate.

DICTYOPHYTON ANNULATUM (n. s.).

PLATE III. FIG. 3.

CYLINDRICAL annulated stems, without nodes, and having a finely reticulated surface.

A fragment about two inches in length, with a similar one by the side of it, are all that have been seen of this species. It has surface-markings not unlike the preceding species, but not so regularly alternating in size, while the annulated stem is distinctive. This form is intermediate to the nodose and smooth-stemmed species.

DICTYOPHYTON TUBEROSUM.

PLAE III. FIG. 1.

Hydnoceras tuberosum : CONRAD, Jour. Ac. Nat. Sciences, Vol. viii, p. 267, & pl. 16, f. 1.

STEM hollow, obconical, rapidly expanding above. Entire surface reticulate by longitudinal and transverse striæ, and marked by several series of longitudinal subangular nodes, which are continued across the intermediate space by a sharp slightly elevated ridge.

The original specimen, which is imperfect, has a length of a little more than five inches, showing five ranges of nodes; while another imperfect specimen has a length of seven inches, with the same number of ranges of nodes. A fragment of a larger individual, with three ranges of nodes, has a length of five inches, with six or seven nodes in each range.

Geological formation and locality. In the sandstone of the Chemung group at Howard and Addison, Steuben county.

DICTYOPHYTON NODOSUM (n. s.).

PLATE III. FIG. 2.

A FRAGMENT two and a half inches in length, being an impression in shaly sandstone, preserves the marks of two longitudinal ranges of rounded nodes, there being six nodes in each longitudinal row in the length indicated.

This species differs from the preceding, in having the longitudinal rows of nodes more nearly parallel, smaller and more clearly arranged in rows, while they are not angular. The surface is finely reticulated by longitudinal and transverse striæ.

Geological formation and locality In the shaly sandstones of the Chemung group in Cattaraugus county.

In the illustrations, I believe I have shown that we have several very distinct species of this group of fossils; and from the localities cited, it will be observed that they have a comparatively wide geographical range, especially when it is considered that they occur in a sedimentary formation which varies in condition and consistence at moderate intervals. Although, with one exception, the New-York and Ohio forms are all specifically distinct, they are closely allied as a group. Knowing only these nodiferous subangular stems? I cannot insist that they are identical in mode of growth with such forms as *Dictyophyton newberryi* and *D. redfieldi*, for we have yet nothing to prove the character of the upper part of the frond in these species.

The generic term UPHANTÆNIA must for the present be restricted to the original specimen, no other congeneric form having been obtained.

In all the collections made in the State of New-York from the Hamilton group, no fragment resembling the DICTYOPHYTON has come under my notice.. Within New-York, these fossils are restricted to the Chemung group; and their occurrence in Ohio, in rocks below the Conglomerate, has always been regarded by me as strong evidence of the equivalency of the formations. The paucity of species of fossils in the Ohio rocks identical with those of New-York has lately furnished an argument against the equivalency of age of these formations; with what force, I leave to geologists to decide. The same doctrines, carried out in their application to other formations, would decide all the *sedimentary groups* of the Mississippi valley to be distinct from those of New-York. The requirement of specific identity among marine fossils to determine geological equivalency can never be fulfilled when sedimentary formations are studied over wide geographical areas.

9. THE FLORA OF THE DEVONIAN PERIOD.

It is only within a comparatively recent period, that we have learned to look for a distinct and well-marked Flora in the Devonian rocks of this country; or, in other words, in the rocks of the Hamilton, Portage and Chemung groups, with their subordinate beds. During the Geological Survey of New-York, when for the first time the sequence of the formations was determined, it was likewise ascertained that remains of land-plants characterized certain of these formations. The greater part of them, it is true, were fragmentary, and those which were in more perfect condition were recognized as of known Carboniferous genera. At that time so little was known of any flora older than that of the Carboniferous period, that reasonable doubts were entertained whether these plant-bearing beds, with Ferns and Stigmaria, particularly of the Chemung group, were not of true Carboniferous age. Nor has this idea been entirely banished by a more complete knowledge of the Fauna of the period, which continued investigations have made known.

While the limits between the Carboniferous and Devonian formations have been very clearly made out along the borders of New-York and Pennsylvania, both by the physical features and carefully studied limits of formations, as well as by the fauna, there has arisen a question as to the relative age of certain beds in Ohio and other Western States. Although the study of the Flora of the Pre-carboniferous rocks of Canada, New-Brunswick, Maine, New-York, and to some extent Ohio, offers a very satisfactory solution of the problem, we are deprived of this means of identification in more western localities. Whatever may be the final determination as to the age of the strata underlying the Coal conglomerate of Central and Southern Ohio, and those of Michigan, Indiana, Illinois and Iowa, which directly underlie the well-marked Carboniferous limestone, the investigation is likely to receive little aid from the Flora. Few or no land-plants occur over the greater part of this area, so far as at present known; while the Fauna is much more abundant than that of the Chemung rocks of New-York.

In following these strata in a southwesterly direction, the number of Brachiopoda has largely increased over those known in New-York, and other fossils, unknown in New-York, have appeared; while some of the fossils most abundant here have ceased altogether, or become rare in those distant localities. In Michigan, on the contrary, the fauna above the Hamilton group, though consisting almost entirely of species distinct from those in New-York, has, so far as I know it, a more littoral character than that of Southern Ohio, Indiana, Illinois or Iowa. Some portion of the Michigan formations, between the Hamilton group and the Carboniferous limestone, should furnish us with land-plants for comparison with those of the Devonian rocks farther east; since we know that the Portage group, in its lower members, is well marked in that region.

Many years since, some of these Devonian plants were published in the New-York Geological Reports, and, at a later period, in the Geological Report of Pennsylvania: the investigations in the Geological Survey of Canada have brought to light other species; and, still more recently, Maine and New-Brunswick have contributed to swell the list.

In tracing the course of the sediments, I have heretofore directed attention to the evidences of the northeastern sources of the materials;* the probable greater extent of dry land in that direction during the period of the Hamilton, Portage and Chemung groups; and consequently the probable greater development of the Flora in that part of the country. This was inferred from the fact that the larger proportion of the species found in New-York were fragmentary, and apparently drifted specimens.

In the study of the higher New-York groups, I have found, accompanied by a gradual change in the sediments and in the fauna, a gradual diminution in the number of species and of individuals of land-plants, as the investigations extended in a westerly and southwesterly direction, until, on the southwestern confines of the State, almost no specimens have been obtained. In the eastern portions of the State, the upper beds of the Hamilton group are everywhere charged with remains of land-plants; but in the western part of the State, their occurrence in this group is extremely rare. It is true that the species marking the Marcellus shale continue, in a deposit of uniform character, as far as Lake

* See Introduction to Vol. iii, Palæontology of New-York.

Erie; but this is not true in regard to the species of the higher beds of the group.

The plants of the Genesee slate and Portage group, recognized in the central part of the State, extend to Lake Erie, and again appear in the same position at Kettle point on Lake Huron.

In the Chemung group, remains of plants everywhere occur in the eastern portions of the State, becoming more rare in the central part, and extremely rare in all the localities examined in the southwestern counties. In the western localities, we everywhere find the drifted or floated fragments, spread in thin laminæ over the layers of shaly sandstone, and the recognizable species are fragmentary. This gradual diminution in the frequency of these remains, and in the size of the fragments, leaves no room to misapprehend the then existing conditions. Almost always mingled in the same beds with marine organic remains, we infer that they are often drifted specimens which have floated from the place of their original growth.

This well-marked condition, over an extent of three hundred miles, clearly foreshadows a limit to the extension of plant remains; for under the same conditions, they cannot continue indefinitely to the westward.

In the general term Devonian, we have recognized in New-York at least four distinct epochs: the first consisting of the Cauda-galli and Schoharie grits, and the Upper Helderberg limestones; the second, the Marcellus shale and Hamilton group; the third, the Portage group; and the fourth, the Chemung group. In the far eastern localities, these subdivisions have not yet been observed; a fact which might be inferred from the similarity of the material in the easterly extension of the three higher groups of the New-York sedimentary formations.

Although the conditions described are unfavorable to a strict determination of geological limitations of species, I believe we may still recognize three epochs in the Flora. Certain species are confined to the Hamilton group; while the Genesee slate and Portage group give another series, and the Chemung group a third. It is probable that when the limits shall be properly determined, no more than one or two species will be found to range beyond the single epoch.

With the exception of the partial and obscure formation of the Cauda-galli grit, the lower members of the Devonian system in New-York, and to the westward, are for the most part marine calcareous accumulations, characterized by certain fossils of ma-

rine origin. On the northeast, however, the system begins with shore-derived sedimentary deposits; and these sediments contain remains of land-plants, even to the base, and it may be uncertain whether some of these do not occur in strata of the subjacent Upper Silurian rocks.

Owing to this great accumulation of land-derived materials in the northeasterly extension of the lower part of the system, while the same epoch was mainly filled by marine deposits farther to the west, we have there the advent of the Devonian marked by its flora, while it is only in the second epoch of its duration that the Devonian of New-York is characterized by the presence of land-plants. It therefore happens that the plants of the New-York Devonian are of the middle and upper divisions of the system, the only evidence of the sedimentary deposits of the first epoch being found in the Cauda-galli grit (a fine gritty shale); and it is probably here, if at all, that we shall find evidences of the older Devonian flora.

Farther to the west we have, both in the fauna and flora, some evidence of another epoch which may bring up the series to the Carboniferous period; but at the present time, we have not the means of speaking with definiteness on this point. Moreover these differences may be due to local causes within the limits of the region investigated; and in the present state of our knowledge, it would be unsafe to draw a conclusion, till farther investigations, now in progress, shall have been completed.

In like manner the Carboniferous period of the northeastern and middle portions is ushered in by a great accumulation of land-derived materials charged with the remains of the luxuriant flora of the period; while in the western extension of the system we find the period beginning with great accumulations of marine deposits, mostly calcareous, and everywhere marked by the presence of marine fossils.

In the distribution of sedimentary materials, the Devonian System presents conditions parallel and similar to the great sedimentary system of the Coal measures. It has its greatest development in thickness at the Northeast, gradually diminishing in a southwesterly direction, until it is reduced to a few feet of shale. In like manner, its most abundant flora has been found in the Northeast, where the accumulations of the system are far greater than in any part of the country west of the Appalachians.

The same conditions have existed, and the same changes have taken place, from the commencement of the great sedimentary

accumulation of the Coal measures. The series of fifteen or eighteen thousand feet in thickness on the northeast gradually diminishes, till in Pennsylvania it is not more than one-fourth or one-third as great; and in the Mississippi valley it has not as many hundreds, as in Nova-Scotia it has thousands, of feet.

Still farther to the west and southwest it has lost its sedimentary character, giving place to calcareous shales, marls and limestones; and the magnificent flora, which marked every stage of its accumulation in the eastern and central regions, has entirely disappeared. It is here no longer the great period of vegetation; and its identification over hundreds, and even thousands of miles, is dependent upon the remains of a few marine animals. Fortunately we have a few otherwise insignificant marine beds in the midst of the sedimentary deposits of the Coal measures in Ohio and Virginia; and but for the continuance of the fossils of these beds in the increasing calcareous accumulations in the far west and southwest, we should there have no means of determining the age and extension of this, elsewhere the greatest sedimentary and plant-bearing formation in the geological history of the globe.

In the same manner, the land-derived materials of the Devonian period gradually diminish in a southwesterly direction, and finally give place to other accumulations, ceasing to be marked by the characteristic flora; while the littoral fauna gradually gives out, or is replaced by another adapted to the changed conditions.

Somewhere in this wide extent, we shall probably find that the gaps, which elsewhere exist between the Devonian and Carboniferous strata, are filled by beds of passage, or those beds which, completing the series, leave no strong lines of demarcation between groups or systems.

The foregoing observations have been suggested by the perusal of the very important paper of Professor DAWSON on the Flora of the Devonian Period. Having never proposed to make a special study of the fossil plants, I have collected those which came in my way; intending at the proper time to submit them to some person engaged in these investigations, who, with more extensive collections for comparison, could bring out more satisfactory results, than could possibly be done with the slender materials furnished by the rocks of New-York.

The previous investigations of Professor DAWSON in the Northeastern Devonian Flora made it very desirable to place in his hands the material derived from the rocks of New-York, in order that unity might be given to the entire subject; and I had no difficulty in obtaining the consent of the Regents of the University to such a disposition of the collections.

In a previous paper, published some time since in the Quarterly Journal of the Geological Society, Professor DAWSON has described the Devonian plants of Gaspé; and more recently he has published, in the Canadian Naturalist, descriptions of other species from Maine and New-Brunswick. In the paper, of which the title is given at the beginning of this notice, the New-York species are described, with new species from New-Brunswick, and a resumé of the known species of Devonian plants from Gaspé, New-Brunswick, Maine, New-York and Pennsylvania. More recently, Professor DAWSON has prepared for publication a supplementary paper relating to the further discoveries in New-Brunswick; by which the number of known species is considerably increased, making the entire known Devonian flora of Northeastern America the number of eighty-two species. When it is considered that so few years have elapsed since we could speak of Devonian plants as distinct from those of the Coal measures, or of a Devonian Flora, it is certainly no unimportant advance to be able to count a flora of this number of authentic species, belonging to more than thirty distinct genera.

In no way can I so well do justice to the subject, or to the labors of Prof. DAWSON, as by giving the introductory part of his paper complete.

On the FLORA *of the* DEVONIAN PERIOD *in* NORTHEASTERN AMERICA.

BY J. W. DAWSON, LL.D., F.G.S.,

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THE existence of several species of land-plants in the Devonian rocks of New-York and Pennsylvania was ascertained many years ago by the Geological Surveys of those States, and several of those plants have been described and figured in their Reports.† In Canada, Sir W. E. LOGAN had ascertained, as early as 1843, the presence of an abundant, though apparently monotonous and simple, flora in the Devonian strata of Gaspe; but it was not until 1859, that these plants were described by the author in the 'Proceedings' of this Society.‡ More recently, Messrs. MATTHEW and HARTT, two young geologists of St.John, New-Brunswick, have found a rich and interesting flora in the semi-metamorphic beds in the vicinity of that city, in which a few fossil plants had previously been observed by Dr. GESNER, Dr. ROBB, and Mr. BENNETT of St.John; but they had not been figured or described. These plants, however, I described in the 'Canadian Naturalist,'|| together with some additional species of the same age, found at

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* Quarterly Journal of the Geological Society, Vol. xviii, p. 296.

† HALL and VANUXEM, Reports on the Geology of New-York; ROGERS, Report on Pennsylvania.

‡ Quart. Journ. Geol. Society, Vol. xv, p. 477.

|| Vol. vii, May 1861.

Perry in the State of Maine, and preserved in the collection of the Natural History Society of Portland. The whole of the plants thus described I summed up in the paper last mentioned as consisting of 21 species, belonging to 16 genera, exclusive of genera like Sternbergia and Lepidostrobus, which represent parts of plants only.

In the past summer I visited St.John, and, in company with Messrs. Matthew and Hartt, explored the localities of the plants previously discovered, and examined the large collections which had been formed by those gentlemen since the publication of my previous paper. The material thus obtained proving unexpectedly copious and interesting, I was desirous of having opportunities of fuller comparison with the Devonian Flora of New-York State; and, on application to Prof. Hall, that gentleman, with consent of the Regents of the University of New-York, kindly placed in my hands the whole of his collections, embracing many new and remarkable forms. Professor C. H. Hitchcock, State Geologist of Maine, had in the mean time further explored the deposits at Perry, and has communicated to me three new species discovered by him. The whole of these collections, amounting in the whole to more than sixty species, constitute an addition to the Devonian Flora equal in importance to all the plants previously obtained from rocks of this age, and establish for some of the species a very extensive distribution both geologically and geographically: they allow, also, more satisfactory comparisons than were heretofore practicable to be instituted between the Devonian Flora and that of the Carboniferous period.

I shall first shortly notice the geological character of the localities, with lists of the fossils found in each, and shall then proceed to describe the new species.

Notices of the Localities of the Devonian Plants.

1. *State of New-York.* The geology of this State has been so fully illustrated by Professor Hall and his colleagues, and the parallelism of its formations with those of Europe has been so extensively made known by Murchison and others, that it is only necessary for me to state that the fossils entrusted to me by Prof. Hall range from the Marcellus shale to the Catskill group inclusive, and thus belong to the Middle and Upper Devonian of British geologists. The plants are distributed in the subdivisions of these groups as follows:

UPPER DEVONIAN.

*Catskill Group.**

Aporoxylon.
Sigillaria simplicitas, *Vanuxem.*
Lepidodendron gaspianum, *Dawson.*
Psilophyton princeps, *Dawson.*
Cyclopteris jacksoni, *Dawson.*
Rhachiopteris punctata, sp. nov.
—— cyclopteroides, s. n.

Chemung Group.

Sigillaria vanuxemi, *Gœppert.*
Syringodendron gracile, s. n.
Stigmaria exigua, s. n.
Lepidodendron chemungense, *Hall.*
—— corrugatum, *Dawson.*
Lycopodites vanuxemi, s. n.
Cyclopteris halliana, *Gœppert.*
Psilophyton princeps, *Dawson.*
Acanthophyton spinosum, s. n.
Rhachiopteris striata, s. n.

MIDDLE DEVONIAN.

Hamilton Group.

Syringoxylon mirabile, s. n.
Dadoxylon hallii, s. n.
Aporoxylon.
Sigillaria.
Didymophyllum reniforme, s. n.
Calamites transitionis(?), *Gœppert.*
—— inornatus, s. n.
Lepidodendron gaspianum, *Dawson.*
—— corrugatum, *Dawson.*
Psilophyton princeps, *Dawson.*
Cordaites robbii(?), *Dawson.*
——, s. n.
—— angustifolia, *Dawson.*
Cyclopteris incerta, s. n.
Rhachiopteris striata, s. n.
—— tenuistriata, s. n.
—— pinnata, s. n.

2. *Maine.* The only locality in this State that has hitherto afforded fossil plants is Perry, near Eastport, in the eastern part of the State. The plant-bearing rocks are grey sandstones, resembling those of Gaspé, and associated with red conglomerate and trappean or tufaceous rocks, which, according to the recent observations of Professor C. H. Hitchcock,† rest unconformably on shales or slates holding Upper Silurian fossils.‡ I have little doubt that these beds at Perry are a continuation of part of the series observed at St. John, New-Brunswick; and it is probable that they are Upper Devonian. The following species occur at this place :

Lepidodendron gaspianum, *Dawson.*
Lepidostrobus richardsonii, *Dawson.*
—— globosus, *Dawson.*
Psilophyton princeps, *Dawson.*
Leptophlœum rhombicum, s. n.
Megaphyton?
Aporoxylon?
Cyclopteris jacksoni, *Dawson.*
—— brownii, s. n.
Sphenopteris hitchcockiana, s. n.

3. *Canada.* Devonian beds holding fossil plants occur in Eastern Canada, in Gaspé, and in Western Canada at Kettle point on Lake Huron. At the former place there is an extensive series of sandstones and shales, regarded by Sir W. E. Logan as representing the whole of the Devonian series, and containing plants throughout, but more abundant in its central portion.‖

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* See explanatory note, p. 107.

† Report on the Geological Survey of Maine, now in the press.

‡ See also notices by Dr. Jackson and Prof. Rogers in the 'Proceedings of the Boston Society of Natural History.'

‖ Reports of the Geological Survey of Canada : Paper on the Devonian Plants of Gaspé, Quart. Journ. Geol. Society, Vol. xv.

At the latter, a few plants have been found in shales of Upper Devonian age. The plants found at Gaspé were described in my former paper, and are,

Prototaxites logani, *Dawson.*	Psilophyton robustius, *Dawson.*
Lepidodendron gaspianum, *Dawson.*	Selaginites formosus, *Dawson.*
Psilophyton princeps, *Dawson.*	Cordaites angustifolia, *Dawson.*

The plants from Kettle point, noticed with doubt in my former paper, I may now refer to the following species :—

Sagenaria veltheimiana, *Gœppert.*	Calamites inornatus, s. n.

4. *New-Brunswick.* The rocks in the vicinity of the city of St.John, constituting a part of the coast metamorphic series of New-Brunswick, have been described in the official reports of Dr. GESNER and Dr. ROBB ;* and additional facts respecting their stratigraphical relations, ascertained by Mr. MATTHEW, were stated in my paper in the 'Canadian Naturalist' already referred to. The new interest attached to these beds, in consequence of the discovery of their copious fossil flora, induced me to re-examine all the sections, in company with Mr. MATTHEW, during my late visit ; and that gentleman has recently extended the limits of our observations eastward in the direction of Mispec. The results of these observations I shall state in some detail, as the precise age of the St.John series has not until now been determined.

The oldest rocks seen in the vicinity of St.John are the so-called syenites and altered slates in the ridges between the city and the Kennebeckasis river. These rocks are in great part gneissose, and are no doubt altered sediments. They are usually of greenish colors ; and in places they contain bands of dark slate and reddish felsite, as well as of grey quartzite. In their upper part they alternate with white and graphitic crystalline limestone, which overlies them in thick beds at M'Clakeney's and Drury's Coves on the Kennebeckasis, and again on the St.John side of an anticlinal formed by the syenitic or gneissose rocks at the suburb of Portland. These limestones are also well seen in a railway cutting five miles to the eastward of St.John,† and at Lily lake. Near the Kennebeckasis they are unconformably overlain by the Lower Carboniferous conglomerate, which is coarse and of a red color, and contains numerous fragments of the limestone.

At Portland the crystalline limestone appears in a very thick bed, and constitutes the ridge on which stands Fort House. Its colors are white and grey, with dark graphitic laminæ ; and it contains occasional bands of olive-colored shale. It dips at a very high angle to the southeast. Three beds of impure graphite appear in its upper portion : the highest is about a foot in thickness, and rests on a sort of underclay ; the middle bed is

* GESNER'S Second and Third Reports on the Geological Survey of New-Brunswick; ROBB, in JOHNSTON'S Report on the Agriculture of New-Brunswick.

† At this place the limestone is penetrated by a thick vein of graphic granite, holding black tourmaline; and at Drury's Cove, not far distant, it contains dykes of dark colored trap.

thinner, and less perfectly exposed. The lower bed, in which a shaft has been sunk, seems to be three or four feet in thickness : it is very earthy and pyritous. The great bed of limestone is seen to rest on flinty slate and syenitic gneiss; beneath which, however, there appears a minor bed of limestone. Above the great limestone are beds of a hard grey metamorphic rock, apparently an indurated volcanic ash, associated with some sandstone; and this is succeeded by the great series of grey, olive, and black shales and flags which underlie the city of St.John. These rocks are well exposed on both sides of Courtney bay, in the city of St.John, and in Carlton. Though somewhat contorted, they have a general dip to the southeast at angles of 50° to 70°. In some of the beds there are great numbers of LINGULÆ, which have not as yet been identified with any described species. There are also trails of Worms, and scratches which may have been produced by the feet of Crustaceans or the fins of Fishes.

The comparative coarse shales above described are succeeded by a thick band of black papyraceous shale, much contorted, and with a few thin seams of calcareous matter arranged in the concretionary form known as cone-in-cone. No fossils were found in them, but two thin seams of anthracitic coaly matter are stated to have been seen on their line of strike eastward of Courtney bay.*

Overlying these beds is a group of very different character. It consists of purplish-red and green grit and shale, with beds of red conglomerate and red sandstone. Interstratified with these are massive beds of a greenish rock, consisting of trappean and felspathic fragments, imbedded in a shining reddish paste, or sometimes presenting the appearance of a compact trap or amygdaloid. This rock usually presents an appearance of greater alteration than the neighboring beds, and contains veins of epidote, quartz and calcspar. Its hard and massive character causes it to resist denudation, and to project above the surface in irregular masses. It has usually been regarded as a trap : I am disposed, however, to consider it as more probably a tufaceous or volcanic ash rock, except in a few places, where it is either an amygdaloid trap, or a mass of fragments of such material too intimately connected to be separated from each other. It is evidently a stratified member of the series, though its beds are very unequal in hardness and texture, and probably also in thickness. This portion of the series is well exposed on the east side of Courtney bay, in the southern part of the city of St.John, and in the direction of Carlton, where its tufaceous or trappean members constitute prominent elevations. It seems also to be this member of the series, which, turning to the south, constitutes Cape Meogenes.

Reposing on the rocks last described is the most interesting member of the series, consisting of hard buff and grey sandstones, with black and dark grey shales. The sandstones contain numerous coniferous trunks; and the shales, which are sometimes highly graphitic, abound in delicate vegetable remains, often in a very perfect state of preservation. These rocks

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* GESNER'S Second Report.

appear on the east side of Courtney bay, near Little river, at the extremity of the point of land on which the city of St. John stands, and in the ledges and cliffs on the shore westward of Carlton. In all these places they are quite conformable with the underlying rocks, though the dip gradually diminishes in ascending.

No rocks newer than the above are seen at Carlton, or in the city of St. John; but near Little river, a few beds of red shale and coarse sandstone seem to indicate the commencement of a new member of the series, the coast-section failing at this point. Mr. MATTHEW has, however, succeeded in finding a continuation of the section further inland; exhibiting first, in ascending order, grey sandstone and grit, with dark shale holding fossil plants, among which is *Calamites transitionis.* This may perhaps be regarded as the top of the group last mentioned. Above it, and passing into it at their base, are reddish sandstones, grits and conglomerate, alternating with green, greenish grey and red shale. Resting on these is a thickbedded coarse angular conglomerate, succeeded by evenly bedded shales, shaly sandstones and grits of dark-red and purplish colors. These are the highest beds seen, as beyond this place they are bent in a synclinal, and reappear with reversed dips.

Another most important observation of Mr. MATTHEW is that near Redhead the member of the St. John series last described is overlain unconformably by a conglomerate similar to that of the Kennebeckasis, and probably the Lower Carboniferous conglomerate. It dips to the northwest, or in the opposite direction from that of the underlying beds, at an angle of 30°; but Mr. MATTHEW regards the dip as due in part to false bedding.

The whole of the deposits above described may be summed up as follows, the thickness stated being from measurements and estimates made by Mr. MATTHEW, and to be regarded as merely approximate* (See figs. 1 & 2).

CARBONIFEROUS SYSTEM.

	Feet.
Coarse red conglomerate, with pebbles of the underlying rocks, and constituting in this vicinity the base of the Carboniferous system.	

DEVONIAN SYSTEM (OR PERHAPS IN PART UPPER SILURIAN).

	Feet.
1. Dark-red and greenish shales; flaggy sandstones and grits; coarse angular conglomerate	1850
2. Reddish conglomerate, with quartz pebbles; reddish, purple and grey sandstones and grits; deep-red, grey and pale-green shales. A few fossil plants	2350
3. Blackish and grey hard shale and arenaceous shale; buff and grey sandstone and flags. Many fossil Plants; Crustaceans and SPIRORBIS,	2000

* In my paper in the 'Canadian Naturalist,' I gave a sectional view of the general arrangement, as observed on a line of section from the Kennebeckasis river to the extremity of the peninsula on which St. John stands. The sections referred to in the text represent the same series, as seen on the east side of Courtney bay, immediately to the east of St. John, with the continuation ascertained by Mr. MATTHEW towards the Mispec river.

		Feet.
4.	Reddish conglomerate, with slaty paste and rounded pebbles; trappean or tufaceous rock; red, purplish and green sandstones and shales. Thickness variable	1000
5.	Black papyraceous shale, with layers of cone-in-cone concretions	400
6.	Hard, generally coarse and micaceous grey shales and flags of various shades of color, and with some reddish shale and tufaceous or trappean matter at the bottom. LINGULÆ, Burrows, and Trails of animals	3000 feet or more.
7.	White and grey crystalline limestone, with bands of shale and beds of graphite	600 feet or more.
8.	Gneissose and other metamorphic beds, with bands of quartz-rock and slate. Thickness unknown.	

The Devonian age of the upper members of this great series of beds I regard as established by their fossils,* taken in connexion with the unconformable superposition of the Lower Carboniferous conglomerate. The age of the lower members is less certain : they may either represent the Middle and Lower Devonian, or may be in part of Silurian age. Their only determinable fossil, the LINGULA of the St.John shales, affords no decisive solution of this question, and the evidence of mineral character is not to be relied on in the case of beds so remote from those regions in which the Devonian rocks of America have been most minutely studied.

In mineral character, Nos. 1 & 2 of the above sectional list might very well represent the Old Red Sandstone, or Catskill group of the New-York geologists. Nos. 3 & 4 might be regarded as the analogues of the Chemung and Portage groups. No. 5 would represent the Genesee slate ; No. 6, the remainder of the Hamilton group ; No. 7, the Corniferous limestone ; and No. 8 might be regarded as a metamorphosed equivalent of the Oriskany and Schoharie sandstones. The entire want of the rich marine fauna of these formations is, however, a serious objection to this parallelism. If, on the other hand, we employ as our scale of comparison the development of the Devonian system of Gaspé, Nos. 1 & 2 will correspond with the upper member of the Gaspé series, and No. 3 with the rich plant-bearing beds of the middle of that series ; but no mineral equivalent of the St.John shales and limestones occurs at Gaspé, unless we seek for it in the Upper Silurian.

The rocks of the St.John group extend along the coast as far as the frontier of Maine ; and there can scarcely be any doubt that the plant-bearing beds at Perry represent some portion of the St.John series, most probably Nos. 2 & 3 of our sectional list. At Perry the plant-beds rest on a trappean bed, which may be the equivalent of our No. 4, a member of the series much more constant in its occurrence than would be anticipated from its composition. According to Prof. HITCHCOCK, this last bed rests

* The scanty animal remains of the plant-beds No. 3 accord very well with the evidence of the fosil plants : they are a small Trilobite, apparently a PHILLIPSIA ; three other Crustaceans, one of which is probably a STYLONURUS, another a EURYPTERUS, and the third a Decapod not apparently referable to any described genus. These Crustaceans are now in the hands of Mr. SALTER (See his paper on these fossils, read before the Society, May 21, 1862). There is also a shell, apparently a LOXONEMA, and a SPIRORBIS.

at Perry unconformably on shales containing a LINGULA which may be identical with that of St. John, and also other fossils of distinct Upper Silurian forms. The analogy of Perry, therefore, as well as of Gaspé, would point to an Upper Silurian age for the lower members of the St. John series, though at St. John they appear to be conformable to the overlying beds. On the other hand, the unconformability at Perry renders it possible that the lower members of the St. John series may be wanting there; and to assign a Silurian date to the lower beds at St. John would imply the entire absence of the copious and characteristic Lower Devonian marine fauna observed at Gaspé and in Nova-Scotia, as well as in Maine, though not in immediate connexion with the Perry beds; while, if the whole series of St. John be Devonian, the absence of this fauna would be accounted for by the metamorphism of the lower beds.

In the present state of the evidence, it would be premature to decide this question, which may be settled either by the discovery of portions of the lower beds in a less altered state, or by tracing the St. John series into connexion with the similar deposits in Maine. In the mean time, therefore, we may be content to regard the upper members of the series as belonging to the later part of the Devonian period, leaving the lower members to be regarded as Lower Devonian or possibly Upper Silurian.

The fossiliferous portion of the St. John series presents the richest local flora of the Devonian period ever discovered. It far excels, in number of genera and species, the Lower Carboniferous flora as it exists in British America, and is comparable with that of the Middle Coal measures; from which, however, it differs very remarkably in the relative development of different genera, as well as in the species representing those genera.

It is only just to observe that the completeness of the following list is due to the industrious labors of an association of young gentlemen of St. John, who, under the guidance of Messrs. MATTHEW and HARTT, have diligently explored every accessible spot within some distance of the city, and have liberally placed their collections at my disposal for the purposes of this paper.

Dadoxylon ouangondianum, *Dawson.*
Sigillaria palpebra, s. n.
Stigmaria ficoides (var.), *Brongniart.*
Calamites transitionis, *Gœppert.*
—— cannæformis, *Brongniart.*
Asterophyllites acicularis, s. n.
—— latifolia, s. n.
—— scutigera, s. n.
—— longifolia, *Brongniart.*
—— parvula, *Dawson.*
Annularia acuminata, s. n.
Sphenophyllum antiquum, *Dawson.*
Pinnularia dispalans, s. n.
Lepidodendron gaspianum, *Dawson.*
Lycopodites matthewi, *Dawson.*
Psilophyton elegans, s. n.
—— glabrum, s. n.
Cordaites robbii, *Dawson.*
—— angustifolia, *Dawson.*
Cyclopteris jacksoni, *Dawson.*
Cyclopteris obtusa, *Gœppert.*
—— varia, s. n.
—— valida, s. n.
Neuropteris serrulata, s. n.
—— polymorpha, s. n.
Sphenopteris hœninghausi, *Brongniart.*
—— marginata, s. n.
—— harttii, s. n.
—— hitchcockiana, s. n.
Hymenophyllites gersdorffii, *Gœppert.*
—— obtusilobus, *Gœppert.*
—— curtilobus, s. n.
Pecopteris (Alethopteris) decurrens, s. n.
—— (——) ingens, s. n.
—— (——) obscura(?), *Lesquereux.*
Trichomanites, s. n.
Cardiocarpum cornutum, s. n.
—— obliquum, s. n.
Trigonocarpum racemosum, s. n.

Geological and Geographical Distribution of the Devonian Plants of Eastern America.

Names of Species.	Upper Silurian.	Low'r Devonian.	Middle Devonian.		Upper Devonian.					
	Gaspe.	Gaspe.	Gaspe.	New-York.	Gaspe.	New-York.	Maine.	New-Brunswick.	Pennsylvania.	Carboniferous.
1. Syringoxylon mirabile	......	......	......	*	....	....	....	....	....	......
2. Dadoxylon ouangondianum	......	......	......	......	....	....	....	*	....	......
3. ——— halli	......	......	......	*	....	....	....	....	....	......
4. Aporoxylon	......	......	......	*	....	....	*	....	....	......
5. Prototaxites logani†	......	......	*	......	....	....	....	....	....	......
6. Sigillaria palpebra	......	......	......	......	....	....	....	*	....	......
7. ——— vanuxemii	......	......	......	......	....	*	....	....	....	......
8. ——— simplicitas	......	......	......	*	....	....	....	....	....	......
9. Syringodendron gracile	......	......	......	*	....	....	....	....	....	......
10. Stigmaria exigua	......	......	......	......	....	*	....	....	....	......
11. ——— ficoides	......	......	......	......	....	....	....	*	....	*
12. Didymophyllum reniforme	......	......	......	*	....	....	....	....	....	......
13. Calamites transitionis	......	......	......	......	....	....	....	*	....	*
14. ——— cannæformis	......	......	......	......	....	....	....	*	....	*
15. ——— inornatus	......	......	......	*	*	....	....	....	....	......
16. Asterophyllites acicularis	......	......	......	......	....	....	....	*	....	......
17. ——— latifolia	......	......	......	......	....	....	....	*	....	......
18. ——— scutigera	......	......	......	......	....	....	....	*	....	......
19. ——— longifolia	......	......	......	......	....	....	....	*	....	*
20. ——— parvula	......	......	......	......	....	....	....	*	....	......
21. Annularia acuminata	......	......	......	......	....	....	....	*	....	......
22. Sphenophyllum antiquum	......	......	......	......	....	....	....	*	....	......
23. Pinnularia dispalans	......	......	......	......	....	....	....	*	....	......
24. Lepidodendron gaspianum	......	......	*	*	*	*	*	*	....	......
25. ——— chemungense	......	......	......	......	....	*	....	....	*	......
26. corrugatum	......	......	......	......	....	*	....	....	....	*
27. Sagenaria veltheimiana‡	......	......	......	......	*	....	....	....	*	*
28. Lepidostrobus richardsoni	......	......	......	......	....	....	*	....	....	......
29. ——— globosus	......	......	......	......	....	....	*	....	....	......
30. Lycopodites matthewi	......	......	......	......	....	....	....	*	....	......
31. ——— vanuxemii	......	......	......	......	....	*	....	....	....	......
32. Psilophyton princeps	*	*	*	*	*	*	*	....	....	......
33. ——— elegans	......	......	......	......	....	....	....	*	....	......
34. ——— glabrum	......	......	......	......	....	....	....	*	....	......
35. Selaginites formosus	......	......	*	......	*	....	....	....	....	......
36. Leptophlœum rhombicum	......	......	......	......	....	....	*	....	....	......
37. Cordaites robbii	......	......	......	......	....	....	....	*	....	*?
38. ——— angustifolia	*	*	*	*	....	....	....	*	....	......
39. Cordaites?	......	......	......	*	..	....	....	....	....	......
40. Megaphyton?	......	......	......	......	....	....	*	....	....	......
41. Cyclopteris halliana	......	......	......	......	....	*	....	....	....	......
42. ——— jacksoni	......	......	......	......	....	....	*	*	....	......
43. ——— obtusa	......	......	......	......	....	....	....	*	....	......
44. ——— valida	......	......	......	......	....	....	....	*	*	......
45. ——— varia	......	......	......	......	....	....	....	*	....	......
46. ——— brownii	......	......	......	......	....	....	*	*	....	......
47. ——— incerta	......	......	......	*	....	....	....	....	....	......
48. Neuropteris serrulata	......	......	......	......	....	....	....	*	....	......
49. ——— polymorpha	......	......	......	......	....	....	....	*	....	......
50. Sphenopteris hœninghausi	......	......	......	......	....	....	....	*	....	*
51. ——— marginata	......	......	......	......	....	....	....	*	....	......
52. ——— harttii	......	......	......	......	....	....	....	*	....	......
53. ——— hitchcockiana	......	......	......	......	....	....	*	....	....	......
54. Hymenophyllites curtilobus	......	......	......	......	....	....	....	*	....	......
55. ——— obtusilobus	......	......	......	......	....	....	....	*	....	......
56. ——— gersdorffii	......	......	......	......	....	....	....	*	....	*
57. Alethopteris decurrens	......	......	......	......	....	....	....	*	....	*
58. ——— ingens	......	......	......	......	....	....	....	*	....	......
59. ——— obscura?	......	......	......	......	....	....	....	*	....	*?
60. Trichomanites	......	......	......	......	....	....	....	*	....	......
61. Rhachiopteris pinnata	......	......	......	*	....	....	....	....	....	......
62. ——— cyclopteroides	......	......	......	......	....	*	....	....	....	......
63. ——— punctata	......	......	......	......	....	*	....	....	....	......
64. ——— striata	......	......	......	*	....	*	....	....	....	*?
65. ——— tenuistriata	......	......	......	*	....	....	....	....	....	......
66. Cardiocarpum cornutum	......	......	......	......	....	....	....	*	....	......
67. ——— obliquum	......	......	......	......	....	....	....	*	....	......
68. Trigonocarpum racemosum	......	......	......	......	....	....	....	*	....	......
69. Acanthophyton spinosum	......	......	......	*	....	....	....	....	....	......

† This species was not noticed in the descriptions, as no new facts relating to it had been obtained.
‡ I have marked this species as occurring in Pennsylvania, being of opinion that it is the same with *Lepidodendron primævum* of Rogers.

CONCLUSION.

In the course of the preceding pages, I have endeavored to notice points of geological and botanical interest as they occurred; and it will now be necessary only to mention a few leading results, as to the Devonian Flora, which may be deduced from the observations above recorded.

1. In its general character the Devonian Flora resembles that of the Carboniferous period, in the prevalence of Gymnosperms and Cryptogams; and, with few exceptions, the generic types of the two periods are the same. Of thirty-two genera to which the species described in this paper belong, only six can be regarded as peculiar to the Devonian period. Some genera are, however, relatively much better represented in the Devonian than in the Carboniferous deposits, and several Carboniferous genera are wanting in the Devonian.

2. Some species, which appear early in the Devonian period, continue to its close without entering the Carboniferous; and the great majority of the species, even of the Upper Devonian, do not reappear in the Carboniferous period; but a few species extend from the Upper Devonian into the Lower Carboniferous, and thus establish a real passage from the earlier to the later flora. The connexion thus established between the Upper Devonian and the Lower Carboniferous is much less intimate than that which subsists between the latter and the true Coal measures. Another way of stating this is, that there is a constant gain in number of genera and species from the Lower to the Upper Devonian, but that at the close of the Devonian many species and some genera disappear. In the Lower Carboniferous the flora is again poor, though retaining some of the Devonian species; and it goes on increasing up to the period of the Middle Coal measures, and this by the addition of species quite distinct from those of the Devonian period.

3. A large part of the difference between the Devonian and Carboniferous floras is probably related to different geographical conditions. The wide swampy flats of the Coal period do not seem to have existed in the Devonian era: the land was probably less extensive, and more of an upland character. On the other hand, moreover, it is to be observed that, when in the Middle Devonian we find beds similar to the underclays of the Coal measures, they are filled, not with STIGMARIA, but with rhizomes of PSILOPHYTON; and it is only in the Upper Devonian that we find such stations occupied, as in the Coal measures, by SIGILLARIA and CALAMITES.

4. Though the area to which this paper relates is probably equal to any other in the world in the richness of its Devonian flora, still it is apparent that the conditions were less favorable to the preservation than those of the Coal period. The facts that so large a portion of the plants occur in marine beds, and that so many stipes of Ferns occur in deposits that have afforded no perfect fronds, show that our knowledge of the Devonain flora is relatively far less complete than our knowledge of that of the Coal formation.

5. The Devonian flora was not of lower grade than that of the Coal period. On the contrary, in the little that we know of it we find more points of resemblance to the floras of the Mesozoic period, and of modern tropical and austral islands, than in that of the true Coal formation. We may infer from this, in connexion with the preceding general statement, that in the progress of discovery, very large and interesting additions will be made to our knowledge of this flora, and that we may possibly also learn something of a land fauna contemporaneous with it.

6. The *facies* of the Devonian flora in America is very similar to that of the same period in Europe, yet the number of identical species does not seem to be so great as in the coal-fields of the two continents. This may be connected with the different geographical conditions in these two periods; but the facts are not yet sufficiently numerous to prove this.

7. The above general conclusions are not materially different from those arrived at by GŒPPERT, UNGER and BRONN, from a consideration of the Devonian Flora of Europe.

The preceding pages, to 104 inclusive, extracted from Professor DAWSON's paper, are followed by the descriptions and notices of sixty-seven species of fossil plants. The summary of the whole, in their geological and geographical distribution, is presented in the accompanying table and "Conclusion," from the same article.

NOTE.

IN a note to Prof. DAWSON, published in the Canadian Naturalist, Vol. vii, No. 5, I have already explained that, from personal explorations made in the autumn of 1862, connected with facts before observed by myself and others, I am satisfied that the beds in the eastern part of the State of New-York, which have been referred to the Catskill group, are in reality, to a great extent, of the Chemung group; that the coarser character of materials in the upper partof the Hamilton group has, in many localities, so simulated the lithological character of the Chemung as to be mistaken for the latter; and I am now disposed to believe that some isolated localities of the upper part of the Hamilton group have been referred to the Catskill group. These erroneous references have arisen, as I have said, partly from the coarseness of the upper part of the Hamilton group, and partly from the occurrence of an extensive deposit of red shaly sandstone and shale at the base of the Chemung group, with alternations of similar beds at intervals in that group. At the same time the fossiliferous beds of the Chemung group are fewer, and the number of their species is far less than in the central and western part of the State. These conditions combined, have caused the Catskill group to be carried downwards from one thousand to fifteen hundred feet below beds which clearly belong to the Chemung group.

The term "*Catskill group* or *Old Red Sandstone*," as applied in the central and western part of the State to some red beds occurring as outliers on the summits of the higher hills, and in a continuous formation beyond the limits of New-York in Pennsylvania, is not at all applicable to any bed in the Catskill mountains below the elevation of the Mountain House. It becomes, moreover, problematical whether anything more than the coarse conglomerate of the upper part of the Catskills can be properly designated Catskill group.

The fossil plants, therefore, which were derived from places heretofore regarded as authentic localities of the Catskill group must all be referred to the preceding formations of the Hamilton and Chemung groups. Even the typical locality of Mount Upton must, I believe, give way before the evidences now accumulating; and the species of fossil plants will occupy but two stages, unless we recognize those of the Genesee slate as an intermediate group to the Hamilton and Chemung.

The arrangement of the list given by Professor DAWSON would then be modified much as follows: *

UPPER DEVONIAN.

Chemung and Portge Groups.

Aporoxylon.	Lycopodites vanuxemi, *Dawson.*
Lepidodendron chemungense, *Hall.*	Cyclopteris jacksoni, *Dawson.*
L. corrugatum, *Dawson.*†	C. halliana, *Gœppert.*
L. gaspianum, *Dawson.*	Psilophyton princeps, *Dawson.*
Sigillaria vanuxemi, *Gœppert.*	Rhachiopteris, *Dawson.*
Syringodendron gracile, *Dawson.*	R. striata, *Dawson.*
Stigmaria exigua, *Dawson.*	R. punctata[?], *Dawson.*

MIDDLE DEVONIAN.

Hamilton Group.

Syringoxylon mirabile, *Dawson.*	Psilophyton princeps, *Dawson.*
Dadoxylon hallii, *Dawson.*	Cordaites robbi(?), *Dawson.*
Aporoxylon.	Cordaites (s. n.).
Sigillaria simplicitas, *Vanuxem.*	C. angustifolia, *Dawson.*
Sigillaria.	Cyclopteris incerta, *Dawson.*
Didymophyllum reniforme, *Dawson.*	Rhachiopteris tenuistriata, *Dawson.*
Calamites transitionis(?), *Gœppert.*	R. pinnata, *Dawson.*
C. inornatus‡, *Dawson.*	R. punctata(?), *Dawson.*
Lepidodendron gaspianum, *Dawson.*	Acanthophyton spinosum, *Dawson.*

* Prof. DAWSON has added to his paper a note making corrections which correspond essentially with those introduced in the table.

† This and *Rhachiopteris striata*, cited as from the Hamilton group of Akron, Ohio, have been thus cited through some mistake. The beds at Akron are of the age of the Chemung of New-York, or the Waverly sandrtone of Ohio, I have accordingly placed them in their proper position.

‡ This species should more properly be placed in the Genesee slate and Portage group. The same species occurs on the Genesee river, in the black shales alternating with green shales at the base of the Portage group; and also on the shore of Lake Erie at Eighteen-mile creek, and between that place and Sturgeon point, in the black and dark greenish shales of the Portage group, which correspond with those of Kettle point on Lake Huron.

The following list of New-York species, with references to the plates and figures of such as are illustrated in the Quarterly Journal of the Geological Society, may prove convenient for future comparisons.

	Quarterly Journal Geological Society, Vol. xviii.
Syringoxylon mirabile	Plate xii, fig. 1 – 5.
Dadoxylon hallii	Plate xiii, f. 11.
Aporoxylon.	
Sigillaria vanuxemi	Plate xii, f. 7.
S. simplicitas.	
Syringodendron gracile†	Plate xiii, f. 14 *a, b.*
Stigmaria exigua	Plate xiii, f. 13.
Didymophyllum reniforme	Plate xiii, f. 15.
Calamites inornatus	Plate xvii, f. 56.
C. transitionis(?)*.	
Lepidodendron gaspianum	Plate xiv, f. 26, 27, 28; and Plate xvii, f. 58.
L. chemungense.	
L. corrugatum†	Plate xii, f. 10.
Lycopodites vanuxemi	Plate xvii, f. 57.
Psilophyton princeps (Vol. xv, p. 479,	f. 1 *a* to 1 *i*).
Cordaites robbi(?)*	Plate xiv, f. 31 *a, b, c, d.*
C. angustifolia.	
Cordaites[?]	Plate xvi, f. 59.
Cyclopteris jacksoni*.	
C. halliana	Plate xvii, f. 54 & 55.
C. incerta	Plate xvi, f. 44 *a, b, c.*
Rhachiopteris pinnata	Plate xvi, f. 60.
R. cyclopteroides.	
R. punctata	Plate xvi, f. 61.
R. striata†.	
R. tenuistriata	Plate xiv, f. 32 *a, b ;* and Plate xvi, f. 45 & 46.
Acanthophyton spinosum	Plate xii, f. 6 *a, b.*

* The species marked thus were credited to New-York localities in the list on page 298, but are omitted in the table at page 326. I have nevertheless included them in this list. The *Sagenaria veltheimiana*, cited by Professor Dawson from Kettle point, Lake Huron, will probably be recognized among the fossil plants of New-York.

† These species are from Ohio, occurring in beds which are regarded as of the upper part of the Chemung group.

FIGURES OF DEVONIAN PLANTS.

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Fig. 1. *Rachiopteris pinnata*, DAWSON. Geological Report of the Third District, page 191, f. 57.

Fig. 2. *Psilophyton princeps*, DAWSON. Geological Report of the Third District, p. 161, f. 40.

Fig. 3. *Sigillaria simplicitas*, VANUXEM. Geological Report of the Third District, p. 190, f. 54.

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Fig. 4. *Rhachiopteris punctata*, DAWSON. Geological Report of the Third District, p. 191, f. 56.

Fig. 5. *Sigillaria vanuxemi*, GŒPPERT. Geological Report of the Third District, p. 184, f. 51.

Fig. 6. *Lepidodendron chemungense*, HALL. Geological Report of the Fourth District, p. 275, f. 127–2. Half the natural size.

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Figs. 7 & 8. *Lycopodites vanuxemi*, DAWSON. Geological Report of the Third District, p. 175, f. 46; and Geol. Report of the Fourth District, p. 273, f. 125.

Fig. 9. *Cyclopteris jacksoni*(?), DAWSON. Geological Report of the Third District, p. 191, f. 58. A pinnule.

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Fig. 10. *Cyclopteris halliana*, GŒPPERT. Geological Report of the Fourth District, p. 275, f. 127–1. The species was originally given as *Sphenopteris laxa*, the specific name of which proved to be preoccupied. Although now placed under the Genus CYCLOPTERIS by GŒPPERT, it is not a true CYCLOPTERIS, as has already been stated by Prof. DAWSON in his paper, page 319.

DEVONIAN PLANTS.

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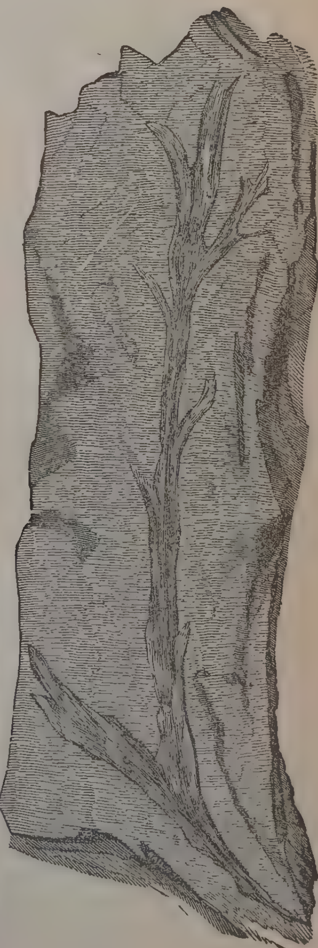

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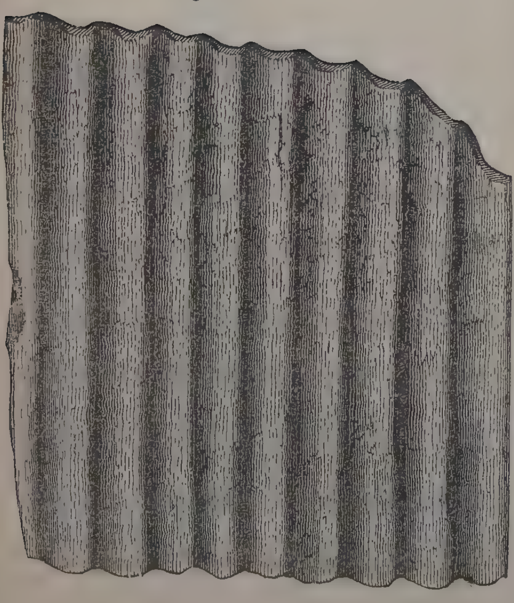

DEVONIAN PLANTS.

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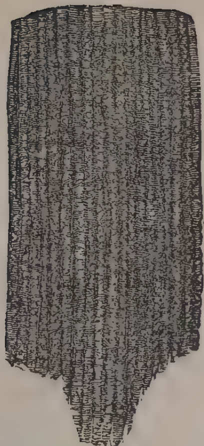

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DEVONIAN PLANTS.

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DEVONIAN PLANTS.

10

10. PRELIMINARY NOTICE OF THE FAUNA OF THE POTSDAM SANDSTONE;

WITH REMARKS UPON THE PREVIOUSLY KNOWN SPECIES OF FOSSILS, AND DESCRIPTIONS OF SOME NEW ONES, FROM THE SANDSTONE OF THE UPPER MISSISSIPPI VALLEY.*

In the final nomenclature of the New-York geologists, the name Potsdam sandstone was adopted for the lowest stratified rock of the series known to contain fossils. The fossils of this rock then known, however, were so few, and their character such as to afford very unsatisfactory means of comparison with the fauna of any distant formation. It was nevertheless considered by them to hold a lower position than any of the rocks *then* recognized as constituting the Silurian System of Great Britain. Up to the time of publishing the first volume of the Palæontology of New-York in 1847, little had been added to the fossils before known from the New-York localities. In fact, neither time nor means for its exploration had been placed at the disposal of the author of that work, and the necessity of making collections and publishing within a limited time prevented such investigations as would have been desirable. Since that period, little has been added to the species before known from New-York localities, except a single species of Conocephalites discovered by Mr. Bradley at Keeseville.

At a later period (1847 – 50), Dr. D. D. Owen, in his investigations in Wisconsin, Iowa and Minnesota, discovered, in the sandstone of the Upper Mississippi valley, a comparatively abundant fauna, which he at first regarded as marking a horizon far below the Potsdam sandstone of New-York, having considered the St. Peters sandstone as the equivalent of that rock. In pursuing some investigations in connection with the United States Survey of the Lake Superior region in 1850, I had an opportunity of tracing the

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* A notice of this paper was read before the Albany Institute, April 29, 1862; and by an arrangement between the Publishing Committee and the Regents of the University, it appears in this connexion.

The receipt of Dr. Shumard's paper† in June 1862, has enabled the writer to add some farther information regarding the species described by Dr. D. D. Owen from the same formation.

† "Notice *of some* new *and imperfectly known* Fossils *from the* Primordial zone Potsdam sandstone *and* Calciferous Sand group) *of Wisconsin and Missouri*," by F. Shumard. Transactions of the Academy of Sciences, St. Louis, May 1862.

formations from Drummond's island and St.Mary's river to the head of Green bay, and thence made a section across the country to the Mississippi river. The position of the sandstone on the St.Marys admitted of no doubt; and its relative position to the lower limestone had before that time been well determined, and the same was likewise ascertained by the several exploring parties along different lines between Lake Superior and Green bay.

Throughout Wisconsin, there is no difficulty in recognizing the following sequence :

TRENTON LIMESTONE;
BLACK-RIVER or BUFF LIMESTONE;
BIRDSEYE LIMESTONE;
ST.PETERS SANDSTONE;
LOWER MAGNESIAN LIMESTONE, or CALCIFEROUS SANDSTONE;
POTSDAM SANDSTONE.

The St.Peters sandstone holds the place of the Chazy limestone of the more eastern localities; and, with this exception, we have the same sequence that we find in New-York, many of the fossils being common to the limestone of New-York and Wisconsin.

Dr. OWEN, in his published Report, has adopted this view of the sequence, and the explorations of subsequent years have confirmed the opinions then entertained; and I believe at this time every geologist will admit the identity of the Potsdam sandstone of New-York and the lower sandstone of the Upper Mississippi valley.

In speaking of this sandstone, I shall, therefore, without hesitation, refer to it as the Potsdam sandstone.

As before remarked, the meagre fauna originally known in this rock in New-York was not sufficient to parallelize it with any European formation, while it was shown to be strongly separated from the next succeeding groups; but since the discovery of these numerous fossils in the Mississippi valley, there has been no longer any hesitation in recognizing the Potsdam sandstone as equivalent in part, and in parallelism with the Primordial zone so fully established in Bohemia by the researches of M. BARRANDE.

These preliminary remarks appear to be necessary; since, so far as we now know, there are no species of fossils in the western sandstone which are positively identical with those of New-York; and those geologists who adopt the opinion that identity of species is required to prove equivalency of age in formations, may take exception to the views here advanced.

With the hope of adding to our knowledge of the primordial fauna of the Northwest, I have, with much labor, selected from very extensive collections of trilobitic remains made at intervals from 1850 to 1859, all that appeared to me of sufficient importance to be illustrated. In a friable sandstone with no vestige of the crust remaining, these fossils offer very unsatisfactory material for investigation. It is, however, apparently impossible to obtain better specimens; for in all the localities examined, the condition is essentially the same. Everywhere fragmentary, the fossils have often been drifted together in such numbers as to make it difficult to trace the limits of individual parts. In a single instance only have a few articulations of a thorax of a trilobite been seen in connection, and these so badly crushed as to be of no use for illustration. The material consists of glabellæ, separated cheeks, caudal shields, and fragments of thoracic articulations either lying separately or crowded together, sometimes forming the principal part of layers one or two inches or more in thickness.

It must be confessed that working with such material is very unsatisfactory; and it has been only after most diligent search in many localities, that I have yielded to the necessity of determining and illustrating species from fragments such as are here given. These species, however, have not been determined from single fragments. In some instances twenty or fifty examples occur; and of most of them, five to ten have been studied. Some of the species have a considerable horizontal range; while others, so far as known, are restricted to a single locality.

I have not been able to make out, with certainty, the regular occurrence of successive trilobite beds, as given by Dr. Owen; but my means of exploration have not been as extensive as were his. It is clear, however, that there is a succession among the species; and we shall probably be able to recognize the fact that those forms occurring near the base of the formation do not extend above the middle, while those of the central portions are not found throughout its entire thickness.

While recognizing some of the species of Dikelocephalus of Owen as Conocephalites,* I find the former in well-characterized

* This has already been done by Dr. B. Shumard in his paper cited, and I have therefore the less hesitancy in publishing this opinion. The personal and traditional knowledge of the originals of Dr. Owen's species, possessed by Dr. Shumard, renders his remarks of peculiar interest and value.

species in the higher beds of the sandstone and in the succeeding magnesian limestone. The lower beds are especially characterized by the presence of CONOCEPHALITES; but I hesitate to admit, among these, the occurrence of the Genus DIKELOCEPHALUS. Notwithstanding the late determination by Dr. SHUMARD of the *D. latifrons* from the lower beds, I cannot avoid the conclusion that this too, with its "truncated conical" glabella, is a CONOCEPHALITES.* In the intermediate beds, however, we have the *Dikelocephalus miniscaensis* of OWEN, which he cites from the third Trilobite bed of F 1, two hundred or two hundred and twenty feet below the top of that formation. In all the specimens obtained, I have failed to find one of this species with a facial suture corresponding to typical DIKELOCEPHALUS, notwithstanding that some of the specimens appear to preserve entire the central portion of the cephalic shield. The direction of the suture is more nearly as in ARIONELLUS, and the places of the eyes more anterior than in *Dikelocephalus minnesotensis* or *D. pepinensis;* while the cheek is short and broad, and little extended at the posterior angle. It appears to me, therefore, that this species should be admitted into the latter genus only after satisfactory evidence of its character shall have been obtained. The typical species, *D. minnesotensis* of OWEN, is cited as occurring in member *d* of F 1, "ninety or one hundred feet below the base of the Lower Mag-" "nesian limestone, near the margin of Lake St.Croix above Still-" "water; towards the base of Lagrange mountain, and at the" "great slide below Lake Pepin, which is the fifth trilobite bed" "of the series of F 1." The *D. pepinensis* is found in the same association as the preceding.

The interval between the lower beds at Mountain island, and those in which these two species of DIKELOCEPHALUS occur, is between four and five hundred feet. This interval may be represented by a greater or less thickness in other parts of the group. It may have been accumulated in a comparatively short time, or it may represent a long period; for although some parts of the series appear to have been rapidly accumulated, there are lines of demarkation indicating a change in the nature of the sediment, and other evidences of beach and shore lines with fucoidal remains, together with mud-cracks and other marks of desiccation, so that we cannot be sure that the accumulation was equal and constant. It may therefore represent an interval, which, in some other part of the country, will be found occupied by a much

* See remarks under the generic description of CONOCEPHALITES, p. 13137.

greater thickness; and these successive trilobite beds may be representatives of that which, in other localities, will be found characterized by a more considerable and distinct fauna. I make this suggestion, from the facts which have fallen under my observation during investigations much too limited in time and area to afford such satisfactory results as I could desire.

It is an interesting and significant fact that the two most characteristic forms of DIKELOCEPHALUS commenced their existence near the close of the Potsdam period proper, passing into the alternating lower beds of the Magnesian limestone; while but one other species of Trilobite has been found in the same association, so far as my investigations have extended.

It is perhaps premature to generalize from these few facts; but according to our present knowledge of the Upper Mississippi valley, we are compelled to regard the typical forms of DIKELOCEPHALUS as characteristic of the close of the Potsdam period.

In addition to the Trilobites, we have a single species of AGNOSTIS, and a new and remarkable Crustacean; the latter from the higher beds of the sandstone, or within about fifty feet of the Lower Magnesian limestone.

The fauna of this sandstone, other than that of the crustaceans, is comparatively meagre, consisting of a few species of LINGULA, a DISCINA, an OBOLELLA?, an ORTHIS, two Gasteropods, one THECA and a SERPULITES?

Of the lower orders of animal life, we have very little at our disposal for its illustration. We know, however, that the family of GRAPTOLITIDÆ appeared in beds which are somewhat above the centre of the formation. Crinoidal columns are cited by Dr. OWEN as occurring in several localities, and I have seen a single obscure specimen which is apparently referable to this family of fossils.

The absence of animal life, in greater variety of forms, seems to be due to the unfavorable character of the sediment, rather than to any other cause. From the fact that every bed, however thin, where there is an admixture of sand with argillaceous matter, or with a small portion of calcareous matter, is seized upon as it were for the habitations of these animals, it is evident that it needed only a more favorable condition of the ocean bed to have developed an extensive fauna. We are, I think, moreover warranted in concluding that at some not far distant but now unknown point, this condition did exist in a much higher degree than in the localities investigated.

In order to make this notice as complete as possible with the materials I now possess, I have, with few exceptions, given illustrations of the species known to me as occurring in this sandstone in the Upper Mississippi valley.

GRAPTOLITIDÆ.

GENUS DENDROGRAPTUS (HALL).

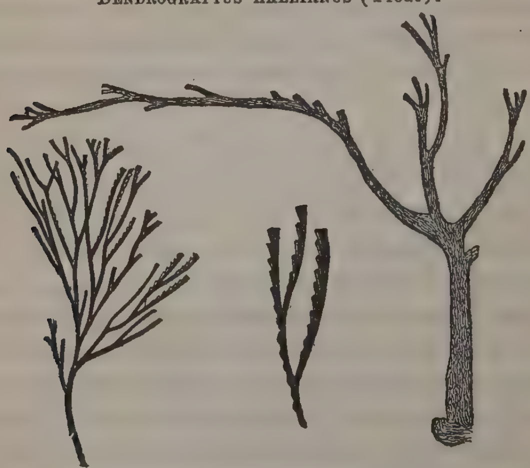
DENDROGRAPTUS HALLIANUS (PROUT).

Graptolithus hallianus : PROUT, Am. Jour. Science (2), xi, p. 187, 1851.

FROND proceeding from a distinct root. Stems strong, numerously branched : branches divaricating, and frequently subdivided ; divisions serrate or celluliferous ; cellules numerous, little elevated above the axis, and not mucronate.

The following figures, already given in the Geological Report on Wisconsin, illustrate the species, so far as the specimens in my possession serve to furnish characters.

DENDROGRAPTUS HALLIANUS (Prout).



a b c

a. A portion of the frond of the natural size.
b. An enlargement of one of the branchlets, showing the cellules.
c. The main stipe and some of the principal branches, natural size. There is a swelling or protuberance at the base, or radicle, one side of which is broken off.

This species occurs in beds somewhat above the middle of the formation, at Osceola mills on the St. Croix river.

BRACHIOPODA.

GENUS LINGULA* (Bruguiere).

LINGULA AMPLA.

PLATE VI. FIG. 10.

Lingula ampla : Owen, Geol. Report on Wisconsin, Iowa and Minnesota, p. 583, Tab. 1 B, f. 5.

Dr. Owen describes this species as having the following characters :

"A greater circumference and superficial area than any of the " others hitherto discovered, in F 1. Shell nearly oval, rather " flat : beak blunt and not projecting beyond the general con- " tour of the shell, and formed more after the beaks of Tere- " bratula. A few faint concentric striæ. Length $\frac{11}{16}$ of an inch; " width $\frac{8}{16}$ of an inch."

The species is cited from "the Obolus grits, member *c*, near Mountain island"; and "at the Dalles of the St.Croix, and else- " where in Wisconsin".

In the lower beds at Trempeleau there occurs a large Lingula, which, in its greatest dimensions, is about $\frac{9}{16}$ by $\frac{11}{16}$ of an inch : a specimen of this species is represented on Plate 7, fig. 22. Since this is the only one known to me in these lower beds, from which *L. ampla* has been cited by Dr. Owen, I am forced to regard it as the typical form of the species.

The shell is rather flat, compared with its size, but not so flat as a species in the higher beds. In well preserved specimens, the lamellose concentric striæ are well defined, but I have not observed any radiating striæ : the cardinal slopes are nearly straight for more than one-third the length; the beak is robust and obtuse [the figure represents the beak too acute].

This species is quite distinct from any of those in my collection from St.Croix river, and I can scarcely suppose it occurs in that position. Its citation thence by Dr. Owen has probably arisen from some admixture of specimens. The specimens from "elsewhere in Winconsin" may have been a species of similar form and size from the higher beds of the formation.

This Lingula characterizes the lowest fossiliferous beds of the formation on the Upper Mississippi river near Trempaleau, and opposite the mouth of Black river.

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* The Genus Lingula has been recognized in the lower rocks, from its similarity of external form and texture to the recent Lingula. It may be doubtful whether the internal structure and arrangement of muscular impressions has been determined in any one of these, and it will probably be a long time before this will be done for any large number of the species. Recent examinations lead me to doubt, much against my inclination to disturb the generally received opinion, whether any of these older forms belong to Lingula proper.

LINGULA WINONA (n. s.).

PLATE VI. FIG. 9.

SHELL small, subquadrilateral, the front nearly straight; sides nearly straight and parallel: apex obtuse, the cardinal margins sloping at an angle of eighty degrees. Surface marked by fine concentric striæ.

This species occurs among some obscure and imperfect specimens from Lansing in Iowa, and is readily distinguished by its short broad form, being less than a fourth of an inch in length and breadth. It is quite distinct from any of those in the lower or upper beds of the series; occurring more than two hundred feet below the Lower Magnesian limestone, and near the middle of the Potsdam sandstone.

LINGULA MOSIA (n. s.).

PLATE VI. FIGS. 1 - 3.

SHELL small, subelliptical or ovate-spatulate, little convex, concentrically striated. The slopes below the beak are sometimes nearly straight for a short distance, and often curving from the beak to the base. The specimens are for the most part impressions in sandstone, with little of the shell remaining, but the form is very distinct from any of the described species; and being limited in vertical range, and with a somewhat wide horizontal extension, it becomes of interest in its associations.

I have given three varieties of form, which for the present I refer to a single species.

FIG. 1. An elliptical form which presents some characters indicating a distinct species, but which for the present I leave with the others.

FIG. 2. A specimen of the ordinary size, with nearly straight sides and front, and the cardinal slopes straight.

FIG. 3. An ovate form, from the same horizon.

FIG. 3 *a*. A more broadly ovate form from the Calciferous sandstone at Stillwater, Minnesota.

This species is intermediate, in form, between *L. antiqua* and *L. prima* of the Potsdam sandstone in New-York, but is distinctly different from either of them. It occurs in the same association with *Dikelocephalus minnesotensis* at Lagrange mountain in Minnesota, and in the same horizon and similar association near Mazomania, Wisconsin.

LINGULA AURORA.

PLATE VI. FIGS. 4 & 5.

Lingula aurora: HALL, Annual Geological Report of Wisconsin, 1860 - 61.

SHELL broadly ovate: beak obtuse, appressed, a little more attenuate in the ventral valve; sides abruptly diverging from the beak including between them an angle of about 85°. Cardinal

slope sometimes nearly straight for less than a third of the length, beyond which it is regularly curved : base broadly rounded, nearly flat or but little elevated.

Surface marked by concentric striæ; and on the middle and front of the exfoliated specimens, radiating striæ are more or less distinctly visible. Besides these, there is a transverse, sharply undulating, or zigzag set of lamellose striæ crossing the others, giving a finely checkered or subpunctate character. In partially exfoliated shells, or in the impressions in sandstone where the shell is mainly dissolved, the surface has a punctate aspect, and, except by a lens, is not distinguishable from such texture.

The surface characters are similar to those of *L. punctata* of the Hamilton group.* It resembles the *L. ampla* of Owen only in general form and size.

At the time of describing *L. aurora*, I had not fully considered the restrictions of character and position of the *L. ampla* of Owen ; but on a review of all the facts, I am satisfied that the latter name must apply to the Trempaleau species, while the name *L. aurora* will be applied to the one from the higher beds.

It occurs in association with *Dikelocephalus minnesotensis*, near Mazomania, Wisconsin, in the upper part of the Potsdam sandstone.

LINGULA AURORA, *var.*

PLATE VI. FIGS. 6 – 8.

Shell ovate, depressed convex, one valve apparently a little longer than the other : apex obtuse.

Surface, in the casts and partial casts, marked by concentric and radiating striæ, giving sometimes a cancellated or granulose structure. The transverse lamellose striæ are coarser, and not so abruptly undulating as in the specimen from the gray sandstone below.

This form occurs in considerable numbers in some red and variegated calcareo-magnesian layers near the top of the Sandstone series, and near the base of the Lower Magnesian limestone.

This and the preceding species are the only Lingulæ which I have observed in the higher beds of the formation, with the exception of a few obscure specimens, the characters of which cannot be fully determined.

Although I have heretofore been disposed to consider that at least one of the species of Lingula of the Potsdam of New-York occurs in the Northwest (and the same has been recognized by Dr. Owen), nevertheless, after a careful examination of the collections in my possession, I am unable to

* Vol. iv, Palæontology of New-York, and page 21 of this Report.

satisfy myself that either *L. prima* or *L. antiqua* has been found in the Mississippi valley. The species of LINGULA present so few salient characters, that it is not surprising that cursory examinations of these fossils, as they are crowded together in great numbers in the beds at St.Croix falls, or when scattered in the sandstone, poorly preserved and often distorted, should sometimes lead to erroneous determinations, which can only be corrected by longer continued examinations and comparisons.

Dr. OWEN has described, under the name *Lingula pinnaformis*, the spatuliform LINGULA from the St.Croix falls, as follows :

" *Specific character.* Shell shaped much like a PINNA, moderately
" convex, expanded and running to a point at the beak, which,
" in the dorsal valve, is long, conical and slender, curved to-
" wards the beak of the ventral valve, which it ovarhangs and
" embraces as with a deltidium. Surface marked with fine con-
" centric striæ : when exfoliated, longitudinal striæ can also
" be detected towards the circumference of the shell. Length
" $\frac{5}{8}$ of an inch; greatest width, $\frac{7}{16}$ of an inch.

" This fossil is abundant in the silico-calcareous layers near the base of
" member *b* of F 1 at the Falls of the St.Croix, Minnesota."

The description above applies to the spatulate forms with elongate slender apices, which are common at the Falls of St.Croix. Associated with these, and in about equal numbers, there is a broad and much shorter form with rounded beak, the margin of which is a little concave from the inner side (as seen from the extremity), apparently for the passage of a peduncle. Among hundreds (and even thousands) of individuals examined, I have never seen two valves of this or the other form in their natural relations. Of both forms, the valves are always separated.

The description of Dr. OWEN does not define the two valves; and since he has recognized ORBICULA and other species of LINGULA in the same beds, I have been in doubt regarding his views of these two forms and their relations to each other.

In order if possible to decide their relations, I have had the shell removed from several individuals, that the casts might be studied. By this process, I have decided that the muscular impressions in the two are considerably different; but they may pertain to the dorsal and ventral valves of a species, while at the same time their characters do not furnish positive evidence that they are not of distinct species.

The muscular impressions are so unlike LINGULA as to afford little means of comparison; that of the shorter valve resembling the flabelliform muscular impressions of the ventral valves of

Orthis, like *O. oblata* and *O. vanuxemi*. The muscular impression in the spatulate valve is narrow above, gradually widening in the middle, with a central line; while its lower part is divided into three lobes, the central one shorter, the lateral ones longer, and diverging so that the outer margins of the impression are nearly parallel to the margin of the shell. The central longitudinal line seems to have been made by an extremely thin septum, which does not reach to the lower extremity of the central muscular impression.

Although several specimens of the broader and shorter form have been exfoliated so as to show the muscular impression, they are all of the same character, and I am compelled to infer that they are of the same valve. At the same time, three individuals of the spatulate form (which have been exfoliated with much difficulty) all presented an identical form of muscular impression.

Notwithstanding that these fossils have all the external characteristics of Lingula, from which it would be very undesirable to separate them, were it possible to do otherwise, yet the form of muscular impressions is so unlike that of modern LinguLæ, as well as of those in the Devonian rocks which I have seen, that it becomes necessary to propose some other designation. In order to retain some indication of their relations, I propose the name Lingulepis.

GENUS LINGULEPIS (n. g.).

Shells linguloid, inequivalve, equilateral, oval-ovate or spatulate: muscular impression, in one valve, flabelliform; in the other, tripartite, the lateral divisions larger. Shell corneous, phosphatic.

The characters above described are from specimens of apparently opposite valves, from the St. Croix falls: their relations are not positively known, no entire specimens having been obtained.

LINGULEPIS PINNAFORMIS.

(LINGULA PINNAFORMIS (Owen).)

PLATE VI, FIGS. 14 & 16; AND ? FIGS. 12, 13 & 15.

Lingula pinnaformis : Owen, Geol. Report of Wisconsin, Iowa and Minnesota, pa. 583, Pl. 1 B, f. 468.
.. .. : Idem, Reports of Wisconsin, Vol. i, p. 21, f. 3, and p. 435.

Shell spatulate, upper part attenuate, acute, slightly truncate at the apex; convex in the middle, with the sides, towards the

apex, abruptly incurved. Surface marked by lamellose concentric striæ; and, when exfoliated, coarse radiating striæ mark the surface of the cast below the middle. In some specimens, radiating striæ are faintly visible in the shell.

The ovate valve associated with the spatulate form has a smooth glossy surface, with fine concentric striæ; and, when exfoliated, the surface of the cast is very distinctly striated by fine even or somewhat bifurcating striæ. Should this form prove to be distinct from the spatulate one, I propose for it the name *Lingulepis matinalis.*

The species is common at the Falls of the St.Croix; and coarse sandy layers, containing the same fossils, occur near the mouth of the Miniska river in Minnesota.

GENUS DISCINA (LAMARCK).

DR. OWEN frequently cites ORBICULA among the fossils of the sandstone, and describes *Orbicula prima*; but the figures given are not satisfactory. These fossils are cited from the St.Croix falls, and upon specimens containing *Lingula pinnaformis*. So many individuals are indicated (figures 13, 16, 17, 18 & 19), that it is clearly a common fossil. Among a large collection made at the locality in 1850, I have been unable to find a DISCINA; and I have been disposed to believe that the broad convex linguloid form, so common in these beds, was at that time referred to ORBICULA.

In all the collections I have but a single specimen which I refer, with doubt, to DISCINA; but this is so obscure as scarcely to merit description. It is from the later beds of the formation, and in the same association with *Dikelocephalus minnesotensis*, at Mazomania, Wisconsin.

DISCINA? INUTILIS (n. s.).

PLATE VI. FIG. 11.

SHELL small, elliptically subquadrate, concentrically striated: apex excentric, nearly marginal.

The specimen appears to consist of both valves, which in the pressure have slipped a little out of place. My only reason for indicating this obscure specimen, is, that ORBICULA (DISCINA) has been regarded as a common fossil of the Sandstone.

GENUS OBOLELLA (BILLINGS, 1861).

"*Generic characters.* Shell ovate, circular or subquadrate, convex "or plano-convex. Ventral valve with a false area which is "sometimes minute, and usually grooved for the passage of the "peduncle. Dorsal valve either with or without an area. Mus-"cular impressions in the ventral valve four; one pair in front "of the beak near the middle or in the upper half of the shell, "and the others situated one on each side near the cardinal "edge. Shell calcareous. Surface concentrically striated, some-"times with thin extended lamellose ridges.

"In general form, these shells somewhat resemble OBOLUS, but "the arrangement of the muscular impressions is different. In "OBOLUS, the two central scars have their smaller extremities "directed downwards and converging towards each other; but "in this genus, the arrangement is exactly the reverse."*

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* In my Annual Report on the Progress of the Geological Survey of Wisconsin for 1860, I described as *Lingula? polita** a fossil possessing characters intermediate to LINGULA and OBOLUS. I remarked that the shell had been referred to OBOLUS by Dr. D. D. OWEN, but that I was then unable to find satisfactory evidence of the characters of OBOLUS: neither were the characters those of true LINGULA. This Report was in the hands of the autherities, and the first form printed during my stay in Madison between the 25th of February and the 5th of March 1861; but the printing of the work was not resumed till the November following.†

Some time before the middle of December 1861, I received the pamphlet of Mr. BILLINGS, published the 21st November, containing the description of the Genus OBOLELLA. In this pamphlet he cites as one of the genus "a small species from the "Potsdam sandstone of the St.Croix river in the Western States, where it occurs "associated with primordial Trilobites described by the late eminent geologist DALE "OWEN."

Subsequently my attention was very rudely called to this paper by an article in the Canadian Naturalist by Mr. BILLINGS, charging me with having availed myself of the knowledge given in his pamplet relative to OBOLELLA, to make the comparisons cited above. The same article, or a similar one, was republished in the American Journal of Science, which has shown a remarkable avidity in publishing anything that might cast reproach upon my labors, or injure me personally.

The fact that the shell which I had under consideration had been referred by Dr. OWEN to "OBOLUS, *Obolus apollinus*, and OBOLUS (APOLLINUS?)"‡, was certainly

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* In printing of this Report, beyond the first form, no proofs were submitted to me, and the quere after LINGULA (?) was omitted by the printer.

† For evidence regarding the date of printing this Report, see Journal of the Wisconsin Senate, "Fifteenth Annual Session", page 181.

‡ See Geological Report on Wisconsin, Iowa and Minnesota, pp. 50, 53, 561, etc., and Table of species, etc. 631; also Explanation of Tab. 1 B.

Mr. BILLINGS has given, of one of the species of the genus, the accompanying illustration of "*the interior of one of the valves, supposed to be the ventral, showing the muscular impressions.*" This will afford the means of comparison with *O.? polita,* figures 20 & 21 on Plate 6.

OBOLELLA CHROMATICA (Billings).

The species of OBOLELLA, cited by Mr. BILLINGS from "the St.Croix river in the Western States", and which he has identified with *Lingula? polita,* has, according to that author, "the central scars" "close together, "one on each side of the median line and parallel".

It becomes necessary, in this connexion, to notice the Genus SPONDYLOBOLUS of M'COY, published in the Annals Nat. History, 2d series, Vol. viii, p. 407; and in British Palæozoic Fossils, p. 255, 1855.

The following is the description of that genus:

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sufficient to suggest some discussions on its relations to that genus, without a hint from any one.

Nevertheless, the species cited by Mr. BILLINGS, if the locality be correct, is clearly not the one described by me; for it does not occur at the Falls of St.Croix, nor on the St.Croix river "in the Western States," so far as I know; nor am I able to find, in Dr. OWEN's Report, any reference of such a form to the Falls of St.Croix: And furthermore I cannot find it anywhere stated by Dr. OWEN that the LINGULA and ORBICULA (or any OBOLUS or Obolus-like forms) "from the Potsdam sandstone of the St.Croix river in "the Western States," or the St.Croix river of Wisconsin and Minnesota, ever occur associated with primordial Trilobites in that locality. Dr. OWEN distinctly describes the "First Trilobite bed" as composed of "Ferruginous Trilobite grits, Schistose sand-"stone containing forktailed Trilobite beds and Obolus layers, 1 – 8 feet; Magnesio-"calcareous rock, with OBOLUS and forktailed Trilobite, 3 feet." The typical locality of these beds is at Mountain island, and they are placed by Dr. OWEN above the "high-"ly fossiliferous, schistose, silico-calcareous layers, interlaminated with argillaceous "marly beds charged with sulphate [sulphuret] of iron; the former full of Lingulas and Orbiculas (Falls of St.Croix)."

At page 94, speaking of the strata above low water of the Mississippi near the mouth of Black river, and Mountain island, Dr. OWEN says: "Here, in addition to "some species of the Genera LINGULA and ORBICULA which occur at the Falls of St. "Croix, there are some remarkable forms of Trilobites, associated with numerous "specimens of OBOLUS." It may be questionable, therefore, whether Mr. BILLINGS refers to the OBOLUS of Mountain island and Black river, or to the ORBICULA of St. Croix river, which is not associated with primordial Trilobites. If he refers to the former, then he should have done justice to Dr. OWEN by citing his observations.

Since, however, the author of the Genus OBOLELLA has taken such pains to proclaim to the world that the little *Lingula? polita* is an OBOLELLA, though mistaking its locality and position, it would be ungenerous to attempt to separate it from that genus.

GENUS SPONDYLOBOLUS (M'Coy).

"Generic character. Suborbicular, slightly narrowed towards
" the indistinct short hinge-line, nearly equivalve, flattened.
" Small valve with a slightly excentric apex; beneath which,
" on the interior, the substance of the valve is thickened into
" a wide undefined boss. Opposite valve slightly longer, from
" the apex being perfectly marginal and slightly produced,
" channelled by a narrow triangular groove below, the anterior
" end of which is flanked by two very prominent, thick, conical,
" shelly bosses representing hinge-teeth : substance of the valve
" thick, testaceous, not glossy, minutely fibrous, but not dis-
" tinctly punctated under a lens of moderate power, except by
" the ends of these fibres."

Whether the characters here given are such as will bear some extension by the study of a larger number of species; and whether, if somewhat extended, they may not include some of those forms like Obolella, I shall not discuss at the present time. With the exception that the apex of the small valve is described as slightly excentric, the description corresponds more nearly than that of Obolella with the shell before me.

OBOLELLA? POLITA.

PLATE VI. FIGS. 17 – 21.

Obolus apollinus : Owen (not Eichwald), Loc. cit.
.. .. .. Geological Report of Wisconsin, Vol. i, p. 21 and p. 435.
Lingula? polita : Annual Geological Report, Wisconsin, 1860, p. 24.

Shell small, short ovate, length and breadth nearly or quite equal; the greatest width near the front, which is broadly rounded. Valves moderately convex, with prominent umbones, somewhat inequivalve : beaks obtuse, one usually a little truncate or emarginate. Surface smooth, sometimes glabrous, with concentric striæ : shell calcareous?, thick, fibrous or lamellose.

The interior of the ventral(?) valve has a broad somewhat cordiform subcentral duplicate muscular impression, with a raised margin. From the centre beneath the beak extends a low flatly rounded ridge, which reaches into and partially divides the muscular impression. On each side of this low ridge is a nearly flat slightly elevated plate or thickening of the shell, which, extending forward, is continued in its outer limbs in a raised border nearly around the muscular impression; giving to the whole a broad spatulate form, leaving a space in front where the shell is marked

by a few radiating or vascular impressions. On each side of this central elevated plate, and at the anterior extremities of the cardinal line, are two smaller muscular impressions. There is a narrow groove beneath the apex of the valve, and on each side of this an elongate thickened boss or pad.

The dorsal(?) valve has a narrow central muscular impression, the limits of which extend in an acute point below the middle of the shell: on each side is a broader limited area, reaching two-thirds the length of the shell, and extending into the cavity beneath the beak. The whole presents an elongate somewhat cordiform area. No marginal muscular impressions have been observed in this valve. Apex emarginate, with a prominent pad or toothlike process on either side.

The following illustrations, on Plate VI, will serve to give a more complete idea of the form and characters of this fossil :

FIG. 17. Natural size.
FIG. 18. A figure enlarged about two diameters.
FIG. 19. Cast of a ventral valve.
FIG. 20. Interior of the ventral valve.
FIG. 21. Interior of the dorsal valve.

These last two figures illustrate all that has been observed in the interiors of these shells.

It is quite probable that specimens, preserved under more favorable circumstances, would show more clearly the character of the interior. Although it may not correspond with the Author's description of the Genus OBOLELLA, it is as clear and distinct a representation of the specimens in my collection as, with much care, could be given.

This species occurs in what I regard as the lowest known fossiliferous beds of the formation, at Trempaleau, Black-river, and other places. It is associated with *Lingula ampla*, *Conocephalites iowensis*, *C. chippawaensis*, and *Theca primordialis.* Some of the layers preserve fucoidal remains, ripplemarks, and evidences of beach lines.

GENUS ORTHIS (DALMAN).

ORTHIS PEPINA (n. s.).

PLATE VI. FIGS. 23 – 27.

This species occurs as casts of the interior, and impressions of the exterior surface; and from the latter, I have obtained casts from which the drawings have been made.

Shell semielliptical. Dorsal valve convex, about three-fourths as long as wide, sometimes proportionally narrower : hinge-line as long as the greatest width of the shell. Ventral valve a little more convex than the dorsal, longer than wide, sometimes one-fourth longer than wide : area high, with beak much advanced; cardinal margins sloping backwards in a straight line to the extremities.

Surface strongly striated : striæ fasciculate, with a few concentric lines of growth. The cast of the ventral valve shows a strongly striated area, a large and long foramen, with the central portion marked by a few strong simple vascular impressions.

The area appears to have been on the same plane with the margins of the shell, and, in the casts, does not always show the strong transverse striæ. The cast of the dorsal valve shows very little of important features : it is regularly convex, and a little flattened in the middle. The cardinal process has been very thin and small, with marks of strong socket-plates : from the outer extremities of these proceed an impressed line which curves towards the sides, and is directed forwards, enclosing a space which is probably the muscular area.

Compared with *Orthis coloradensis*, in specimens from Texas, received from Dr. Francis Moore, this species is usually smaller, the length of ventral valve proportionally greater, with a higher area and finer striæ.

Fig. 23. Dorsal valve of *Orthis pepina*.

Fig. 24. Ventral valve of same species, the form more than usually elongated.

Fig. 25. Cast of dorsal valve of same. The line limiting the muscular impression is made too strong, and the elevation of the central portions too abrupt.

Fig. 26. Cast of ventral valve, showing height of area, cast of rostral cavity, and vascular impressions.

Fig. 27. A cast of the ventral valve, showing a narrower area, with the cavities made by the dental lamellæ.

The specimen of the cast of the dorsal valve figured is the largest that has been found.

The *Orthis pepina*, though occurring in several localities, has been obtained in characteristic specimens only in yellowish and sometimes light buff-colored sandstone on Lake Pepin, above Reed's landing. It occurs at Miniska on the Mississippi river, and at Osceola on the St.Croix river.

GASTEROPODA.

GENUS PLATYCERAS (Conrad).

PLATYCERAS PRIMORDIALIS (n. s.).

PLATE VI. FIG. 28.

Shell rotund, rapidly expanding from the apex, and spreading to a broad aperture : volutions about one and a half.

The specimen figured is a cast in friable sandstone, preserving scarcely more than evidence of its generic relations. It is chiefly interesting as showing the early existence of this form of Gasteropod. One or two other specimens only have been observed : they occur in gray sandstone with greenish particles on the Kickapoo river, and at Trempaleau, in a position below the middle of the formation.

GENUS EUOMPHALUS (Sowerby).

EUOMPHALUS? VATICINUS (n. s.).

PLATE VI. FIG. 29.

Several specimens of a euomphaloid shell have been found in the sandstone of the Mississippi valley. One of these preserves about four volutions of regularly increasing size, and gently convex above. Another specimen shows a deep umbilicus, with the volution a little flattened on the lower side, and subangular on the periphery and umbilical margin.

These imperfect specimens are characterized only for the interest attached to their geological position and association.

Fig. 29. The upper side of a somewhat distorted specimen, from the upper portion of the formation at Lagrange mountain.

PTEROPODA.

GENUS THECA (Sowerby).

THECA PRIMORDIALIS.

PLATE VI. FIGS. 30 & 31.

Theca primordialis : Hall, Annual Report of Progress, Geological Survey of Wisconsin, 1861, p. 80.
.. .. .. Geological Report of Wisconsin, 1862, Vol. i, p. 21.
Pugiunculus : cited in the text of this paper.

Shell elongate, gradually tapering to the somewhat obtusely pointed apex. Transverse section subtriangular or plano-convex, the diameters about as two to one : length of shell about three and a half times as great as the width of the aperture ; one side very convex or nearly flat ; the opposite side often regularly rounded, sometimes a little angular along the centre. Aperture transverse, the margin on the flat side extended and forming a semicircular lip ; that of the convex side transverse to the axis of the shell, with sometimes a slight emargination near the middle.

Surface marked by fine lines of growth parallel to the margin of the aperture, and also on the flat side by numerous strong undulations following the lines of growth. The shell, where preserved, has the same texture and appearance as the Lingulæ with which it is associated ; but it is more readily decomposed. It sometimes attains a length of one inch and a quarter.

Some specimens of this fossil originally examined, induced me to regard the shell as phosphatic, like the Lingulæ ; but subsequent examinations have not verified this opinion.

This fossil usually occurs as casts of the interior, the shell having been removed. Large numbers of individuals are sometimes found closely crowded together, as if having been drifted by waves or currents. It is associated with *Lingula ampla, Obolella? polita, Conocephalites minor* and *C. iowensis*, at Trempaleau. It likewise occurs near the mouth of Black river, and on the Chippewa river? in Wisconsin.

ARTICULATA.

GENUS SERPULITES (M'LEAY).

SERPULITES MURCHISONI.

PLATE VI. FIG. 32.

Serpulites murchisoni : HALL, Annual Report of Progress, Geological Survey of Wisconsin, 1861, p. 48.

.. .. Geological Report of Wisconsin, 1862, Vol. i, p. 21.

BODY elongate, extremely compressed, very gradually tapering to the acutely pointed apex, gently curved throughout its entire length. Both sides (as they are imbedded in the sandstone) very depressed-convex, with the margin of the aperture prolonged on the inner side of the curve.

SURFACE of both sides marked by fine transverse lines of growth, and by numerous strong somewhat equidistant undulations parallel to the margin of the aperture. Length of a large individual two and a half inches, with a transverse diameter at the aperture of three-tenths of an inch.

The specimens of this species may have been circular when living, as the prolongation of the margin of the aperture would indicate; this not always having the same relative position, and the greatest extension being sometimes halfway between the inner and outer angle. In these specimens the curvature is not quite as great as in those where it is marginal, which would indicate a tubular shell flattened in a direction oblique to the plane of the curvature.

This fossil occurs in some dolomitic beds of the sandstone at Lagrange mountain in Minnesota, where it is associated with *Dikelocephalus minnesotensis* and *D. pepinensis*. It has not been found, so far as at present known, in any other locality. Its position, therefore, is in the later beds of the formation.

CRUSTACEA.

GENUS DIKELOCEPHALUS (OWEN).

"CEPHALIC shield semicircular and rather flat. Glabella moderate-
" ly convex, equally wide throughout, rounded in front, divided
" by two furrows into three distinct lobes : these well-marked
" furrows extend quite across the glabella, and form a curve or
" slightly obtuse angle in the median line directed backwards.
" The anterior lobe is partially divided by a third obscure
" furrow, which becomes obsolete in the median line.

"FACIAL sutures distinct, originating in the anterior [posterior]
" border of the cephalic shield : they run at first parallel with
" the same; then convergieg in a sigmoid flexure around the
" eye-plate, diverge again in curved lines, until, reaching the
" anterior border, they circumscribe an area of greater or less
" extent in front of the glabella.

"THE cheek-plates produced at their anterior [posterior] corners
" into spines of moderate length.

"PYGIDIUM rather deeper and about the same width as the ce-
" phalic shield, with from four to six segments; the last and
" largest segment sometimes obscurely subdivided by a faint
" furrow. Lateral and interlateral segments blended into a
" marginal flap or border of greater or less extent: usually, if
" not always, provided with caudal spines."

In the form and expression of the glabella, there is considerable resemblance to PARADOXIDES, except that it is not expanded in front. The direction of the facial suture, however, is conspicuously different. The extended frontal limb in the typical species does not appear to be a generic feature; for in the *D. pepinensis* of OWEN it is narrow and convex. The thoracic articulations are marked by a simple groove running out at the lower margin of the distal extremity, which is pointed backwards. The hypostomæ associated with *D. minnesotensis* are very similar to the hypostomæ of PARADOXIDES. In the *D. pepinensis* we have a facial suture as in *D. minnesotensis*, with a narrow convex frontal limb; while the pygidium is narrow, prominently convex in the axis, with a plain border of moderate width.

In the fragmentary condition of all the specimens, it becomes exceedingly difficult to decide, in some instances, the limits of this genus. The glabella in *D. pepinensis* preserves but indistinctly the furrows anterior to the principal one crossing it. When carefully examined, however, we find two faint indentations on each side of the glabella, which may have been more considerable in the crust than appear in the cast. In the *D. minnesotensis*, I have failed to observe more than a single indentation on each side, anterior to the furrow which crosses the glabella. The posterior furrow is oblique at its extremities, as in the glabellar furrow of Conocephalites and some others : the second furrows, according to the generic description, are "obscure." In species like *D. spiniger*, where the glabella is slightly narrowed anteriorly, and the posterior furrow is deeply impressed at the sides and less strong in the middle, while the second one is conspicuously marked at the sides and faintly across the glabella, with a faint anterior furrow, we have a close approach to the characters of species referred to Conocephalites; nor is it easy to determine the limits of these genera, from the fragments in our possession.

DIKELOCEPHALUS MINNESOTENSIS.

PLATE IX, FIGS. 5 – 10; PLATE X; AND PLATE XI, FIGS. 1, 3 & 4.

Dikelocephalus minnesotensis : Owen, Geol. Report Wisconsin, Iowa and Minnesota, page 574, Tab. 1, f. 1, 2, 10; and Tab. 1 A, f. 3 & 6.

Body large, somewhat quadrilateral, convex in the middle, with the sides and extremities depressed or flattened.

Head broad, semielliptical, with the posterior angles of the cheeks prolonged.

Glabella moderately convex, longer than wide, or as long in front of the occipital furrow as the width; sides parallel; front rounded. Occipital furrow comparatively narrow and well defined, with a wide, nearly flat or little convex occipital ring. The posterior glabellar furrow crosses the glabella as far from the occipital furrow in the middle as the width of the occipital ring, and curves forward so as to terminate a little behind the anterior limit of the palpebral lobe. Anterior to this furrow there is on each side a shallow groove, reaching about one-third across the glabella.

The facial suture cuts the anterior contour in a nearly vertical line from the outer limb of the palpebral lobe, and is thence directed inwardly in a slightly curved line to the anterior limit of the palpebral lobe : thence turning almost rectangularly outwards, it curves gently downwards into the posterior limb of the cheek, at a distance from the dorsal furrow of five-sixths the

width of the glabella. Dorsal furrow strongly defined at the sides, and distinctly limiting the glabella in front.

FIXED cheeks comparatively narrow, spreading opposite the centre of the palpebral lobe; the posterior limb about the same width as the cheek anterior to the eye, and deeply grooved; the frontal limb broad and nearly flat, without elevated or thickened border, or with this feature scarcely perceptible. The extension of the frontal limb is equal to a little more or less than half the width of the glabella.

MOVABLE cheeks large, somewhat triangular, with a deep sinus at the inner angle for the place of the eye, convex towards the eye, and flattened or concave between this convexity and the outer margin: exterior limb scarcely thickened, produced posteriorly into a thin flattened spiniform process.

HYPOSTOMA broad; the body convex and subcircular or very broadly oval, with margins expanded and furrowed near their antero-lateral angles.

In small specimens, there is a minute node near each anterior angle.

THORAX wide, the axis narrow, moderately convex, strongly defined by the dorsal furrow, less than one-fourth the entire width of the body: lateral lobes nearly flat, the segments marked by a simple groove which begins on the upper margin of the rib at the dorsal furrow, and, becoming central at a point about half the length of the rib, continues in the same direction, bending downwards and extending into the slightly recurved extremity.

PYGIDIUM broad, more than once and a half as wide as long: axis very prominent; the lateral lobes convex near the axis, and, sloping rather suddenly downwards, become depressed and flattened towards the margin. Axis marked by four annulations, exclusive of the lower terminal one and the anterior articulating joint: lateral lobes marked by four ribs which are deeply divided from their origin, with a slight elevation close to the posterior extremity of the axis and the anterior simple rib. The extremities of the ribs terminate in a broadly expanded limb, which is gently curved at the sides, and producéd at the postero-lateral angles into a short process, leaving a wide gently curving posterior margin.

The surface of the movable cheeks, of the caudal expansion, and of the extremities of the thoracic segments, is strongly striate.

The lower surface of the pygidium is more strongly marked than any other part.

This species occurs in the higher beds of the formation, and usually within fifty to one hundred feet below the Lower Magnesian limestone. We also find a similar or identical species in the Magnesian limestone.

In its extremes of size, this species has a wide range. The smallest head which I have observed has a length of one-fourth of an inch, including the frontal limb; while the largest one has a length of more than two and and a half inches, with a width between the extremities of the posterior limbs of the fixed cheeks of more than four inches. A pygidium associated with the latter has a length of two and a quarter inches, with a width of more than three and a half inches. A fragment of a thoracic segment measures, from the centre of the axis to the extremity, more than two and a half inches; which would give the width of the body five inches. A pygidium found in a loose mass of Lower Magnesian limestone near Madison, Wisconsin, by Mr.   , measures nearly two inches and three-fourths in length, and four inches and three-quarters in width.

PLATE IX.

FIG. 5. A large head from Mazomania : the frontal limb is given in form and proportions from another specimen, in which it is preserved entire.

FIG. 6. A pygidium from Lagrange mountain.

FIG. 7. The pygidium of a large individual from the Magnesian limestone. This one presents some slight differences in the form and proportions of the axis, when compared with fig. 4 of Plate xi.

FIG. 8. A part of the thoracic segment from the Lagrange mountain locality.

FIGS. 9 & 10. Hypostomæ found in the same locality, and referred to this species.

PLATE XI.

FIG. 1. A hypostoma associated with the specimens of fig. 5 of Plate ix and fig. 4 of Plate xi, and clearly belonging to this trilobite.

FIG. 3. A cheek from Lagrange mountain. Similar cheeks occur with the preceding specimens, and some of them are much larger than this one; measuring two inches in width in the widest part, and an inch and a half in the narrower portion, or double the width of the one figured.

FIG. 4. A pygidium from Mazomania*.

The hypostoma, Plate xi, f. 1, is doubtless of this species; having been found associated with fragments of several large individuals at Mazomania, where I have not seen any other large trilobite.

The specimens figs. 9 & 10 of Plate ix are from Lagrange mountain : they present some differences, and both differ somewhat from the larger one. All are imperfect; the specimen figure 9 being more nearly entire than the others. They belong either to the *D. minnesotensis* proper, or to the form given in fig. 11, Plate ix; since no other species, except the *D. pepinensis*, and the extremely rare form fig. 12, Plate ix, are found at that locality; and the hypostoma of *D. pepinensis* is given in fig. 4, Plate ix.

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* This specimen is associated in the same beds with fig. 5, Plate ix; having been obtained from the locality at a subsequent period.

DIKELOCEPHALUS MINNESOTENSIS, *var.* LIMBATUS.

PLATE IX. FIG. 12.

A single fragment shows the anterior part of the glabella, and nearly the whole of the frontal limb. In this specimen the antero-lateral angle of the frontal limb is more rounded, and the anterior margin elevated in a distinct border which does not appear to be thickened. Within this border are a few wrinkled striæ, directed towards the glabella. In a single small individual from Lagrange mountain, I have seen a similar but less defined border.

Without other specimens, I am unwilling to indicate this as a distinct species. It occurs with *D. minnesotensis* and *D. pepinensis*, at Lagrange mountain.

DIKELOCEPHALUS MINNESOTENSIS, *var.*

PLATE IX, FIG. 11; AND PLATE X, FIG. 9.

General form of head and glabella as in *D. minnesotensis*. Glabella moderately convex, and slightly narrowing in front of the eyes. Occipital furrow straight : posterior glabellar furrows oblique ; the anterior one slightly marked, and nearly straight. The frontal limb is rounded at the antero-lateral angles, and slightly extended in the middle.

The marked difference between this form and the *D. minnesotensis* is in the frontal limb, which is extended in the middle so as to interrupt the continuous curve of the contour. A single individual, having this feature of the frontal limb in a marked degree, was found at Lagrange mountain ; while two other individuals have been found at Stillwater, in the Lower Magnesian limestone or Calciferous sandstone.

These differences, of apparently minor importance, might not be regarded as worthy of specific distinction ; but we have, at the same time, a difference of form among the hypostomæ. Whether these are all varieties of form of one species, may admit of same doubt with our present means of comparison. It may be imprudent to multiply specific designations for such remarkable forms as the *D. minnesotensis*, and those presenting so many features in common with that species.

Plate ix, fig. 11, is a small specimen (one side of which has been restored in the figure) from Lagrange mountain, Minnesota.

Plate x, fig. 9 The glabella and fixed cheeks of a large individual from Stillwater, Minnesota.

In the latter specimen, the oblique truncation of the frontal limb on each side is not so extreme as in the smaller individual; and from the symmetrical contour still remaining, it appears as if separated along a suture line.

DIKELOCEPHALUS PEPINENSIS.

PLATE IX, FIGS. 1–4; AND PLATE X, FIGS. 13–17.

Dikelocephalus pepinensis : OWEN, Geol. Report of Wisconsin, Iowa and Minnesota, page 574, Tab. 1, f. 9 & 9 *a*; and Tab. 1 A, f. 7?

BODY comparatively narrow, subelliptical, wider anteriorly. General contour of the head semielliptical, with extremely elongated cheek-spines.

GLABELLA prominent, longer than wide, usually a little narrowed anteriorly. Occipital furrow straight and narrow : occipital ring broad, depressed-convex, not rising higher than the glabella in front of it. Posterior glabellar furrow a little oblique at the extremities, and straight in the middle : anterior to this furrow are two slight indentations on each side of the glabella, near the anterior limit of the palpebral lobe, which do not reach to its summit. Dorsal furrow strongly defined, and joining a wider furrow which limits the front of the glabella.

FIXED cheeks narrow, expanded in the direction of the eye, and separated by a distinct groove from the palpebral lobe; posterior limb narrow, with the furrow extending about half its length, and running out on the upper side : frontal limb convex, a little wider in the middle than at the sides, separated from the glabella by a wide slightly curving furrow.

MOVABLE cheek subtriangular, with a wide deep ocular sinus at the inner angle, convex towards the eye, with a wide shallow depression just within a broad elevated limb; posterior margin short, the genal angle produced in a long nearly straight spine, which is more than twice as long as the body of the cheek.

HYPOSTOMA subelliptical, with a slight angular extension on each side a little behind the centre; border elevated along the sides, and slightly truncate in front : an oblique depression on each side near the anterior end, directed from the margin forward and towards the middle.

AXIS of the thorax convex and strongly defined : lateral lobes wider than the axis, except at the posterior part, where they are nearly equal.

PYGIDIUM somewhat semielliptical, wider than long, rounded in front : axis strong and highly elevated, conical, tapering somewhat rapidly, marked by five annulations besides the elongated posterior one and the anterior articulating segment. Lateral lobes convex near the axis, and at the middle of their width sloping abruptly downwards, with a flattened continuous margin; marked

by four distinct ribs which are deeply divided throughout their length, and become merged in the flattened limb : the anterior simple rib is prominent, subangular, and continued to the margin of the border. The contour of the margin is apparently continuous, and uninterrupted by spiniform extensions.

This species is readily distinguished from the preceding, by the narrow frontal limb of the glabella; in the cheeks, by the long spine; and in the pygidium, by the more prominent axis and less expanded border, without the posterior spiniform extensions.

PLATE IX, FIG. 1, shows the form of the glabella and fixed cheeks.
FIG. 2. The pygidium.
FIG. 3. A movable cheek.
FIG. 4. The hypostoma.

In the collection from Lagrange mountain in Minnesota, this species greatly outnumbers its associate the *D. minnesotensis*. It is not known to attain so large a size, nor does it occur in other localities so frequently, as that species. In the Mazomania collections I have seen but a single individual, and I have no specimens from any other place. Dr. OWEN has cited only the locality of Lagrange mountain for this species.

DIKELOCEPHALUS SPINIGER (n. s.).

PLATE X. FIGS. 1, 2 & 3?

GLABELLA somewhat semicylindrical, very convex; sides gently converging, truncate in front; length little greater than the width: posterior furrows very oblique and deeply impressed for nearly one-third the width of the glabella, and continued by a more shallow furrow across the summit; second furrows indented at the sides, and continued across the glabella in a scarcely perceptible impression. The anterior furrows are slight indentations in the sides of the glabella, leaving a very narrow anterior lobe. The occipital furrow is deeply impressed, straight in the middle, and bending a little forward towards ths extremities : occipital ring convex above, a little curving forward at the sides and very prominent in the middle, supporting a spine. Dorsal furrows strongly impressed, and more deeply marked in front of the glabella. The frontal limb is a regularly convex elevated band.

FIXED cheeks narrow at the sides, expanding in the direction of the palpebral lobes, which are defined by a strong furrow. The posterior limb is unknown.

In the same fragment of rock with the glabella, there is a pygidium which I have presumed to belong to this species. The axis

is broad and prominent, marked by about five rings besides the articulating one : the lateral lobes slope abruptly downwards, then curving they spread in a broad flattened border (which is everywhere incomplete in the specimen); each side is marked by four ribs, exclusive of the anterior one; the two forward ribs are divided through a part of their length, and the four appear as gentle undulations in the border.

This species possesses the essential characteristics of glabella given by Dr. OWEN for DIKELOCEPHALUS, except the slight convergence of the sides ; and I have therefore referred it to that genus.

The glabella, frontal limb and fixed cheeks resemble *D. pepinensis;* but the occipital ring in this one is more convex, and bears a spine ; the occipital furrow is not so direct, while the posterior glabellar furrows are more oblique : the second or median pair of furrows can be traced across the glabella, while the anterior ones are slight indentations in the margin, like the anterior and middle ones of *D. pepinensis.* The dorsal furrow is more sharply impressed at the sides ; turning rectangularly in front of the glabella, which is more truncate, and separated by a narrower furrow from the more convex frontal limb.

These features are important distinctions, since in this one the approach to the Genus CONOCEPHALITES, in the form of glabella and glabellar furrows, is very perceptible. The pygidium has the general expression of *D. minnesotensis,* being somewhat more convex, but the minor characters are very different.

This species occurs at Trempaleau, in calcareo-magnesian sandstone, near the middle of the formation.

DIKELOCEPHALUS MISA (n. s.).

PLATE VIII, FIG. 15; AND PLATE X, FIGS. 4, 5, and ? 6, 7 & 8.

GLABELLA prominent, somewhat conical, truncate at the apex, the length about equal to its width at base, which is more than one-third greater than the width in front. Three pairs of furrows are visible ; the posterior ones oblique and sometimes slightly marked across the middle, leaving the posterior lobes deeply separated and directed forward at the extremities. Median lobes and furrows directed a little forward ; anterior furrows faintly impressed, leaving a very narrow anterior lobe ; occipital furrow well defined, straight in the middle, and curving a little upwards at the sides : occipital ring wider in the middle, curving forward towards the extremities.

FACIAL suture directed slightly inwards from the anterior margin, and thence curving gently outwards, it follows the line of the

palpebral lobe nearly to the occipital furrow, when it turns abruptly outwards. Dorsal furrow rather wide and deep, continuing a little less distinctly around the front.

FIXED cheeks narrow, expanding in the direction of the eye, and separated from the palpebral lobe by a long distinct sigmoid groove : posterior limb narrow, its extent unknown. Frontal limb of moderate width, separated from the glabella by a narrow groove, marked along the middle by a broad shallow transverse furrow, which is stronger at the sides and sometimes nearly obsolete in the middle; anterior margin flattened, and a little produced in the middle.

The characters here given are pretty constant in several specimens : the prominent lobed glabella, broad dorsal furrow, and narrow fixed cheeks, are distinguishing features. The posterior glabellar furrows are sometimes continued in a slight depression across the centre. The frontal limb is sometimes, but not always, a little produced in the middle, and a shallow furrow is always perceptible.

A well-formed specimen gives the following measurements : Length of glabella, 0·30 of an inch; width at base, 0·29; width at apex, 0·22; frontal limb, 0·12; entire length of head, 0·48.

A pygidium in the same association, and apparently belonging to this species, has the anterior margin much curved, the axis very prominent, and the lateral lobes convex near the axis, concave and flattened towards the margins. The axis is marked by four annulations, exclusive of the anterior ridge : the posterior one is elongate, and apparently indented about the middle of its length. The lateral lobes have three or four ribs, which are longitudinally divided, and terminate in a flattened border : the divisions are narrow and prominent.

In species like this one, it is not easy to point out the characters which separate them from such forms as *Dikelocephalus spiniger* or *D. pepinensis;* and we have the features of glabella intermediate between the more characteristic forms of CONOCEPHALITES and DIKELOCEPHALUS. In this one the glabella is more conical, and the posterior glabellar furrows scarcely united across the summit.

The pygidium which occurs in several specimens associated with the glabella, has the prominent axis and broad lateral lobes with wide margin which are characteristic of the DIKELOCEPHALUS, and I am therefore induced to place the species under that genus.

This species occurs in the second fossiliferous beds at Trempaleau, and in the greenish sandstone near the same horizon at Miniska, about the middle of the formation.

DIKELOCEPHALUS OSCEOLA (n. s.).

PLATE X, FIG. 18; AND PLATE VII, FIG. 49?

HEAD small in the specimens observed, having a length of less than half an inch.

GLABELLA with the sides nearly parallel, slightly narrowing anteriorly, truncate in front. Occipital furrow narrow and well defined : occipital ring of the same convexity as the glabella, and of equal width throughout. Posterior glabellar furrow sharply defined in the cast, and extending in a backward curve entirely across and terminating a little in advance of the centres of the palpebral lobe : the second furrow slightly marked on the sides of the glabella. Dorsal furrow narrow and well defined in the posterior part, slightly marked in front.

FIXED cheeks narrow, expanding towards the eye : palpebral lobe limited by a distinct groove, which, in its posterior inward curve, extends to a point opposite the extremity of the occipital ring. Frontal limb of moderate width, extended in front of the glabella in a broad depression, which is nearly flat in the bottom, and thence rising abruptly in a narrow marginal rim.

This species has been observed in three imperfect specimens of the head. It resembles in general features specimens of the three preceding species *(D. pepinensis, D. spiniger* and *D. misa);* but is distinguished from all of them by the wide depression in front of the glabella, and the abruptly elevated narrow border. These specimens have the characteristics of the Genus DIKELOCEPHALUS, as shown in all the preceding species. It occurs in the sandstone at Osceola mills, associated with ILLÆNURUS.

A small glabella associated with this one does not show the second pair of furrows : it is more sharply truncate, and a little wider in front ; the frontal limb is shorter ; the depression anterior to the glabella is narrower, and the marginal rim a little stronger and very straight in front. This specimen and the others are associated with a pygidium described below.

A PYGIDIUM (of this species?, Plate vii, f. 49) has the axis comparatively narrow and abruptly elevated, marked by six annulations besides the anterior articulating segment. The lateral lobes are marked by about four ribs, besides the anterior segment.

The anterior margin of the pygidium is extremely curved, and the antero-lateral angles are produced into long curving spines which are as long as the body of the pygidium. The posterior margin between the spines is rounded, and the ribs terminate in a continuous thickened border.

At least five individuals of this peculiar species have been seen. The figure is twice enlarged, from a cast made in the natural mould in sandstone, associated with the glabellæ described above.

GENUS CONOCEPHALITES (ZENKER).

I HAVE referred to this genus several species heretofore placed under DIKELOCEPHALUS and LONCHOCEPHALUS by OWEN; restricting the former designation to the typical species of that author, which are certainly very distinct from some of the others described under that genus. Those species with the more conical and highly arched forms of glabella were in part designated by Dr. OWEN as LONCHOCEPHALUS, of which one character is the long spine projecting from the base of the glabella.

The generic description of LONCHOCEPHALUS is as follows:

"*Generic character.* In this small and singular genus the highly "arched glabella is either undivided, or has only two very "obscure furrows. A spine of greater or less length projects "backwards from the base of the glabella, in the median line "of the body over the thoracic segments (fig. 12, Tab. I A). "The pygidium found associated in the same beds is semilunar, "with little or no border, and has four segments of the axal "lobe."

The Genus CREPICEPHALUS was created for other forms, of which Dr. OWEN speaks as follows:

"The rather flat slipper-shaped glabella is tapering and slightly "acuminated anteriorly, with a faint ridge in the median line: "two small and very superficial depressions, and a posterior "faint furrow, very partially divide the glabella. The facial "sutures run nearly parallel to the margin of the glabella, and "join a thickened cordlike anterior narrow border, enclosing "a convex area, narrower in front than at the sides. Oblique "plications can sometimes be traced on the cheek-plate in "advance of the eye, converging towards the apex of the "glabella."

We observe here also characteristics of the Genus CONOCEPHALITES in the conical glabella with obscure furrows, and the ocular ridges in the oblique plications, etc.; while the only *species* designated by Dr. OWEN (the *C. wisconsensis*) has a wide frontal limb, and offers no means of distinction in the head from one species placed under the Genus LONCHOCEPHALUS (the *L. hamulus*).

It is difficult and perhaps impracticable to sustain these genera, or either of them, upon the characters here given; though it must be admitted that there is some difficulty in referring all these species to CONOCEPHALITES, when we restrict the signification to such forms as the *C. sulzeri* and *C. striatus*.

In several of our species the glabella is very depressed convex, and the oblique furrows are wanting or very obscure. It must be stated, however, that we are always dealing with the casts of the interior, and therefore these markings are necessarily obscure. The presence of spines from the occipital ring cannot of course be regarded as of generic importance, while the caudal spines in one species may perhaps be admitted as unobjectionable in CONOCEPHALITES. At the same time many of the thoracic segments associated with the cephalic shields having the characters noticed, are not like those of CONOCEPHALITES. On the other hand, instead of terminating abruptly at the extremities, they are suddenly bent backwards in an elongated spiniform extension, very similar to the segments in PARADOXIDES. Other forms, both of the head and of the separated thoracic segments, bear some characters in common with OLENUS.

When we look at the course of the facial suture, the form and proportion of the eyes, we find them varying from the characters of CONOCEPHALITES as exhibited in the species cited above.

In the last named characteristics, many of our western species correspond more nearly with the *C. emmerichi* of BARRANDE, which likewise has a node on the occipital ring. Were it not for the extension of the pleura, we would find no difficulty in the comparison with this European species. This feature of the thoracic segments would demand an extension of the characters of CONOCEPHALITES, or the admission of a separate genus; in which case, to avoid the multiplication of synonymy, I would suggest that one of the names proposed by Dr. OWEN be adopted.

I hesitate at the present time to separate these forms from CONOCEPHALITES, because the material, being all fragmentary and in the condition of moulds or casts, may not carry with it the conviction to the minds of naturalists, that it otherwise might do. The glabella, moreover, with the fixed cheeks, being referable to forms of similar character to *C. emmerichi*, offer, in these parts, the greatest analogy with CONOCEPHALITES.

CONOCEPHALITES MINOR (SHUMARD).

PLATE VIII. FIGS. 1-4.

Conocephalites minor : SHUMARD, Trans. Acad. Sciences of St. Louis, Vol. ii, p. 105.

"VERY small. Glabella well defined by linear dorsal furrows, " subcircular, much elevated above the cheeks, regularly con- " vex, slightly longer than wide, marked on either side with " two short deep lateral furrows, which are directed obliquely " backwards, and reach not quite one-third the distance across: " neck-furrow linear, distinctly but not deeply impressed, si- " nuate, arched forward in the middle; neck-segment short " triangular, gently convex, not elevated, posterior angle ter- " minating in a delicate acicular spine which is prolonged " backwards, its length unknown; front margin narrow, convex; " cheeks rounded, having very delicate ocular ridges, which " pass from the eyes in a short curve to reach the glabella a " short distance in advance of the anterior glabellar furrow. " Length of head, 0·10 of an inch; length of glabella, 0·08."

Among a large number of specimens in my collection, which I have referred to this species, there are some varieties of form. A single specimen of the head, destitute of cheeks, which was kindly sent to me by Dr. SHUMARD, from near the mouth of Black river, has a more rotund form, and the glabella is proportionally shorter than in specimens from Trempaleau, before regarded as undescribed, but which I have now identified with the species of Dr. SHUMARD. The sandstone of the Black-river locality is of somewhat different character, finer and more compact; and the difference in form may be due only to physical conditions.

In the Trempaleau specimens the glabella is ovoid and very gibbous; the width and length to the occipital furrow about as three to four, varying slightly in different specimens, some of which are proportionally longer. The lateral furrows reach about one-third across the glabella. The anterior furrow is short and slightly oblique : the middle furrow is more deeply impressed; and the posterior furrow is more oblique and deeper, separating the posterior lobe so that sometimes it appears like an ovoid tubercle. The occipital furrow is either direct or a little arched forward, sharply impressed : the occipital ring is short, triangular, and extended posteriorly into a slender sharp spine, which, including the segment, is about as long as the glabella. The dorsal furrow is strongly defined, limiting the glabella as distinctly in front as at the sides. The fixed cheeks are narrow, convex or

rounded longitudinally, a little wider anteriorly, rarely showing ocular ridges : the posterior limb is much extended. The frontal limb is convex, narrower than the cheeks, marked by a sharp groove, and terminated by an equally sharp, straight, narrow border. The movable cheek is small, broadly triangular, with a well-defined border which is prolonged into a short spine, and on its inner angle supports a prominent oculiform tubercle.

The caudal shields associated with this species are small, somewhat semicircular or paraboloid, with the axis prominent and marked by about six rings. The lateral lobes show four distinct ribs, which terminate in a narrow border.

Well-formed specimens measure, from the neck-furrow to the anterior limb, about 0·12 of an inch; the glabella being 0·10 of an inch in length, and about 0·07 of an inch in width.

The figures 1, 2, 3, 4, are views of the glabella and fixed cheeks, a profile of the same, a separated movable cheek, and a pygidium, which are all four times enlarged.

This small species is very common in the sandstone at Trempaleau, associated with *C. iowensis*, *Lingula ampla*, *Obolella?* and *Pugiunculus* or *Theca.* Dr. Shumard cites the *Conocephalites*(*Lonchocephalus*)*chippewaensis* as occurring in the same association, near the mouth of Black river on the Mississippi. The original *C.* (*L.*) *chippewaensis* of Owen is cited by the author as from the *fourth* or Marine-mills trilobite bed, while the *C. minor* is in the *lower* trilobite bed.

The following species of Conocephalites is from the Potsdam sandstone of New-York:

CONOCEPHALITES MINUTUS.

PLATE VIII. FIGS. 5, 6 & 7.

Conocephalites minutus : Bradley, American Journal of Science, Vol. xxx, p. 241, 1860.

Head semicircular, somewhat straight in the middle of the front, with the posterior angles of the cheeks produced into spines which are more than half as long as the cheek-shields.

Glabella very gibbous, ovate conical, a little longer than the width at the base, slightly narrowed behind; marked by three pairs of glabellar furrows, the anterior ones being usually obscure : occipital ring prominent in the middle, and produced into a spine, which, measuring from the occipital furrow, is about three-fourths as long as the glabella. Occipital furrow narrow and well defined. Dorsal furrow narrow, somewhat sharply defined, and continued of the same strength in front of the glabella.

FIXED cheeks comparatively wide, with the posterior limb short: ocular ridges distinct, reaching the dorsal furrow just behind the anterior glabellar furrow. Frontal limb extended, with a thickened and elevated anterior border which is a little wider in the middle.

MOVABLE cheeks narrow, with ocular sinus comparatively large: the border is thickened and produced in a slender extension in front, and posteriorly produced into a distinct spine.

This species is given in this place for comparison, since it has been regarded as identical with the *C. minor* of Wisconsin. They are much alike, and, on cursory examination, might not be distinguished. From specimens which have been kindly given me by Mr. BRADLEY, the form of glabella and fixed cheeks have been determined, and a figure of the movable cheek has subsequently been added to the plate from a specimen in Mr. BRADLEY'S collection.

The figures are four times enlarged. The greater width of the fixed cheeks, and the smaller movable cheek of this species, are distinctive features. The straight anterior border and wide fixed cheeks give the aspect of OLENUS to the frontal limb.

FIG. 5 The glabella and fixed cheeks of *C. minutus*, four times enlarged.
FIG. 6. Profile of the same.
FIG. 7. A movable cheek of the same.

This species occurs in the Potsdam sandstone at Keeseville, N.Y.

CONOCEPHALITES EOS (n. s.).

PLATE VII, FIGS. 24 & 25; AND PLATE VIII, FIGS. 8 & 9.

GLABELLA very gibbous, width at base equal to its length from the occipital furrow; sides curving and gently narrowing anteriorly: anterior extremity abruptly rounded at the angles, and slightly curving in front. The posterior furrow is obliquely curved, reaching nearly to the base of the glabella, leaving the posterior lobe as a prominent node. The middle furrow is less distinct, slightly curving, and reaching nearly one-third across the glabella. The anterior furrow is not visible in the cast. The occipital furrow is comparatively broad, deep and well defined, curving forwards at the extremities: occipital ring very convex, rounded, and a little more elevated than the back part of the glabella. Dorsal furrow deep and strongly defined, particularly in the middle of its length: fixed cheeks very narrow at the sides, and arching longitudinally; the palpebral lobe separated from the cheek by a long sigmoid groove which reaches nearly to the groove in the posterior limb: the latter is

broad, and the border narrow. The frontal limb has a wide and deep groove in front of the glabella, with an abruptly raised narrow anterior border, the whole being curved suddenly downwards at the anterior lateral angles.

This species is conspicuously distinct from any of the others by its very gibbous glabella, which is nearly equal in length and width. The posterior and medial glabella-furrows are well marked, but there is no distinct indication of the anterior one.

Specimens containing this fossil were derived from a loose mass of sandstone at Trempaleau, apparently from the beds near the locality, since it was little worn. From the character of the rock, its position is probably between the extreme lower and middle fossiliferous beds.

The three preceding species have the form of glabella which is characteristic of Conocephalites, and the facial suture cuts the frontal contour at a point distant from the apex. In the last one, however, the direction of the suture-line in its posterior course is different from the others, and there is a distinct groove defining the palpebral lobe; a feature not observed in the other two.

In the following species, the glabella is conical, and more or less distinctly marked by oblique furrows. The suture-line partially cuts the anterior border at a point distant from the apex, but a narrow portion of the cheek-border extends along the frontal limb nearly or quite to the apex. This course of the suture-line produces a sloping or curved outline from the apex to the lateral margin of the frontal limb. The fixed cheeks are very narrow, and prominent towards the eye; but in none of them are there well-marked ocular ridges, and the palpebral lobe is not observed to be distinctly limited by a groove, except in *C. anatinus*. In the latter character there is no departure from typical Conocephalites; but in the course of the suture-line in front, there is a departure from the recognized species of that genus.

The species thus grouped are the *C. perseus*, *C. shumardi*, *C. nasutus*, *C. oweni*, *C. eryon*, *C. anatinus* and *C. patersoni*.

Among the remains of some of these species we find the "*doublure*" or lower border of the frontal limb, separated as a single piece; presenting a feature somewhat similar to the corresponding part of Paradoxides, except that its continuity on the posterior margin is not broken by the attachment of the hypostoma. This portion of the front, however, has a distinct, central, vertical suture, as in Asaphus (See fig. 38 *a*, Plate vii).

Should the species possessing these features be found to require separation from Conocephalites, I would propose the name Conaspis.

CONOCEPHALITES PERSEUS (n. s.).

PLATE VII, FIGS. 17–23; AND PLATE VIII, FIG. 33.

GLABELLA cylindrico-conical, gibbous, rounded at the anterior extremity. Glabellar furrows very distinct; the posterior furrows oblique and deeply impressed, and extending across the glabella: the second furrows are nearly rectangular to the axis, distinct at the sides, and extending almost across the glabella; anterior furrows obscure or obsolete, and close to the anterior extremity, the anterior lobe very short. Occipital furrow comparatively deep, curving forward in the middle and at the extremities: occipital ring as high as the posterior part of the glabella, or sometimes a little higher. Dorsal furrow sharply and neatly defined, and its continuation in front almost as well marked as at the sides.

FACIAL suture vertical in its anterior line, curving at the prominent palpebral lobe, and making a sharp curve outwards at its lower angle.

FIXED cheeks narrow; palpebral lobe prominent; posterior limb narrow triangular; frontal limb short and traversed in the middle by a deep groove, from which the narrow anterior margin rises abruptly: outline in front a little produced in the middle. The centre of the palpebral lobe is opposite the middle of the glabella. In the very gibbous form of the glabella and deeply marked posterior furrows, which are united across the middle, and in the narrow and deeply grooved frontal limb, it differs from any of the species described.

A pygidium associated with numerous specimens of the glabella is nearly semicircular, slightly curved on the anterior margin, with a narrow prominent axis which is marked by three or four annulations besides the terminal one, the latter bearing two obscure nodes. The lateral lobes are scarcely convex, with about three divided ribs.

This species occurs on the Mississippi river, opposite the mouth of the Chippewa, associated with *Conocephalites diadematus* and *Arionellus bipunctatus*. It likewise occurs in gray ferruginous sandstone at Kickapoo, associated with *C. shumardi;* differing from that one conspicuously in its more cylindrical glabella.

CONOCEPHALITES SHUMARDI (n. s.).

PLATE VII, FIGS. 1 & 2; AND PLATE VIII, FIG. 32 & 19?

GLABELLA broad, truncate-conical, width at base greater than the length, convex, gibbous in the middle, and in large specimens a little flattened or depressed-convex on the sides. Posterior furrows oblique, leaving a large prominent posterior lobe; middle furrow oblique and deeply marked; anterior furrows shorter and less oblique, leaving a small anterior lobe. Occipital furrow somewhat strongly defined, straight in the central part, curving forward at the sides : occipital ring curving forward, wider in the middle. Dorsal furrow strongly marked at the sides, deeply indented at the anterior angles of the glabella, and continued in front of the same depth as at the sides.

FACIAL suture vertical in front of the eye, meeting the anterior angle of the palpebral lobe opposite the anterior glabellar furrow. The palpebral lobe extends as low as the posterior glabellar furrow, whence the suture turns outwards and obliquely downwards.

FIXED cheeks of moderate width, and, in larger specimens, distinctly marked by ocular ridges which extend from the anterior glabellar furrow to the anterior margin of the palpebral lobe: the posterior limb is comparatively broad, triangular. Frontal limb of medium width, rising somewhat abruptly from the furrow in front of the glabella, and forming a rounded, more or less prominent ridge, descending into a subcentral groove, from which the anterior border rises abruptly, forming a narrow ridge which is a little wider in the middle than at the sides.

This is a well-marked species, preserving its distinguishing features even in the smallest specimens. It is remarkable for the great width of the glabella at its base, the strong glabellar furrows, and truncate apex; while the prominent ridge in front of the glabella, with the anterior furrow and sharply elevated margin, are peculiar. The ocular ridges, conspicuous in the larger specimens, are observable in the smaller ones.

A small specimen gives the following measurements : Length of glabella, .18 inch; width at base, between .19 & .20; width at apex, .11; frontal limb, .09. Entire length, .32 inch.

Several larger specimens are imperfect; one of them being nearly twice as large as the one measured.

This species occurs, in numerous small specimens, in the ferruginous gray sandstone at Kickapoo, Wisconsin, associated with *Conocephalites nasutus* and *C. diadematus*. In one specimen from a different bed, there is a single individual of twice the ordinary size. Numerous specimens of considerably larger size than the ordinary forms at Kickapoo have been found at Marine mills on the St. Croix river, associated with *C. oweni*.

CONOCEPHALITES NASUTUS (n. s.).

PLATE VII. FIGS. 3 – 9.

A small species with a somewhat broad head. Glabella short, truncate conical, somewhat abruptly convex, the length equal to the width at its base; the posterior and middle furrows oblique, and somewhat deeply marked; the anterior one near the front of the glabella, and often inconspicuous in small individuals. Occipital furrow somewhat wide and deep, straight in the middle, making a slight curve backwards, and thence forward at the extremities : occipital ring rather broad in the middle and narrower at the sides. Dorsal furrow linear, well defined, and extending with the same strength in front of the glabella, which rises abruptly, while the cheeks are nearly flat.

Fixed cheeks narrow, elevated in the direction of the palpebral lobe : posterior limb narrow triangular; frontal limb extended, scarcely convex, and sloping downwards from the glabella for two-thirds the length, where it is marked by a transverse furrow, beyond which it is contracted at the sides, a little convex in the middle and attenuated towards the anterior margin.

The movable cheek (of this species?) is somewhat elongate, gradually narrowing to the posterior extremity, which is produced into a slightly curved spine of moderate length. The facial suture reaches to the base about one-third the distance from the marginal rim to the eye.

This species is abundant in the gray and ferruginous sandstone of Kickapoo. It is pretty uniform in its characters, and easily recognized by the pinched and nasute anterior portion of the frontal limb. The posterior portion of the limb is sometimes scarcely convex, and in others it is elevated in a convex band. In its short broad truncato-conical glabella it resembles *C. shumardi;* but in that species the cheeks are more elevated towards the eyes, and the anterior margin of the frontal limb is abruptly elevated into a sharp narrow ridge, the dorsal furrow is deeply pitted at the anterior angles of the glabella, and the glabellar furrows more deeply impressed.

The species associated with this one are *C. diadematus*, *C. shumardi* and *C. perseus*.

CONOCEPHALITES OWENI (n. s.).

PLATE VIII. FIGS. 17 & 20.

Glabella ovate-conical, the width at base equalling or a little less than its length from the occipital furrow, regularly convex and gently curving in front. Posterior glabellar furrows ex-

tremely oblique, the middle ones less so, and reaching not more than one-third across; the anterior furrows not distinctly seen. Occipital furrow shallow, of equal width throughout, or sometimes nearly obsolete at the extremities and a little wider in the middle : occipital ring having about the same convexity as the back part of the glabella. Dorsal furrow well defined, not sharp or deep, and continuing of the same depth in front of the glabella.

Fixed cheeks narrow. The line of the facial suture, from the front contour, is nearly vertical (with the exception of the palpebral curvature) to the posterior glabellar furrow, whence it turns obliquely outwards, leaving a narrow posterior limb, which has a lateral extension two-thirds as great as the width across the axis at the occipital ring : frontal limb regularly convex, and curving abruptly downwards in front.

Movable cheek moderately convex, more than half as wide as long, with regularly curving outer margin and thickened border which is produced anteriorly, and the posterior extremity extends in a slender spine. Sinus, formed by the eye-tubercle, of medium size.

In two specimens, carefully measured, we have the entire length of glabella 0·30 of an inch; width of glabella at base, 0·29; at apex, 0·18; entire length of head, 0·44; frontal limb, 0·10 of an inch. In another specimen, these measures are respectively 0·25, 0·23, 0·14, 0·38, 0·09.

This species, in its glabella and frontal limb, somewhat resembles *C. eryon* (fig. 16), but the proportions are somewhat different : the glabella is narrower at base and much more convex; the frontal limb is not quite so extended, and is more convex; the facial suture continues its vertical direction farther down, leaving a narrower posterior limb of the fixed cheek.

The heads and cheeks of this species, in the condition represented on the plate, occur in myriads in certain layers at Marine mills : the slabs are covered with these, and remains of two other species which are comparatively rare. This position, according to Dr. Owen, is above the middle of the Sandstone series in the Fourth Trilobite bed.

The *Conocephalites (Lonchocephalus) chippewaensis* of Owen is cited by that author as occurring in the fourth or Marine-mills Trilobite grit; and before I had critically examined this one, I supposed the smaller specimens to be the same. After having studied numerous specimens without finding evidence of a spine from the occipital ring (that being a conspicuous feature of the *C. chippewaensis*), I am constrained to refer the specimens to some other species. Most of the specimens, moreover, are much larger than the figures of Dr. Owen.

In some of the slabs from Marine mills there are spines which appear to have belonged to the posterior part of the head of some trilobite, and these may possibly belong to the species of Dr. OWEN which I have failed to procure. Some of the species appear to be restricted to a very limited range, and it is quite probable that my specimens are from a different layer than that in which *C. chippewaensis* occurs.

CONOCEPHALITES ERYON (n. s.).

PLATE VII, FIGS. 10–16; AND PLATE VIII, FIGS. 16 & 31.

SPECIMENS consisting of the glabella and fixed cheeks, with imperfect movable cheeks and a pygidium.

GLABELLA ovate conical, a little wider at base than the length from the occipital furrow, depressed convex, arcuate : sides gently curving on the lower half and more rapidly above, slightly truncated anteriorly : furrows oblique and faintly marked, extending more than one-third across; the anterior one usually imperceptible, and the others frequently obscure. Occipital furrow shallow and not sharply defined in the middle, deeper and more strongly defined at the sides : occipital ring not elevated above the general convexity of the glabella, somewhat triangular in form, projecting backwards in the middle.

FACIAL suture nearly vertical from the front to the eye-lobe, which is anterior to the middle of the glabella : behind this it makes a slight curve and extends backwards, making an angle of about 60° with the line of the axis.

DORSAL furrow very shallow at the sides, and continued less distinctly in front of the glabella; the fixed cheeks being little elevated, and the glabella rising more abruptly. The fixed cheeks are narrow in the upper part, elevated in the direction of the eye, but the palpebral lobe is not well defined; the lower limb broadly triangular, with a shallow posterior furrow; the frontal limb broad, depressed convex and arching downwards in front, and transversely marked by a shallow groove about one-third its length from the front.

More than one hundred individuals of this species have been observed on a single slab of stone, and the characters are well preserved from the smallest specimens to the largest one.

The entire length of the head of a large specimen is	0.65	of an inch.
Length of glabella	0.35	..
Width of glabella at base	0.37	..
Width of glabella in front	0.18	..
Length of frontal limb	0.12	..

One of the smaller specimens has the entire length of head 0.11 of an inch.

This description of the species is taken from numerous specimens obtained at Trempaleau; while a single specimen from near Lacrosse (Plate viii, f. 31), with the same proportions, has the glabella more bent downwards in front, and the sides are more indented by the furrows, only two of which are distinctly seen. The fixed cheeks are precisely as in the Trempaleau specimens.

A separate cheek, apparently of this species, is subtriangular, depressed convex, a little prolonged in front and apparently obtuse behind, with a thickened border and small eye.

A pygidium, associated with these specimens, is short and wide, with a strong prominent axis, which has three distinct annulations besides the anterior one, with two or three distinct ribs on the lateral lobes. The entire width is 0.47 of an inch, and the length 0.21; the axial lobe being 0.19 of an inch wide.

CONOCEPHALITES ANATINUS (n. s.).

PLATE VII, FIGS. 34 & 35; AND PLATE VIII, FIG. 29.

Glabella depressed-convex, subovate-conical, slightly subangular along the middle, rounded anteriorly, the sides curving, the base nearly straight, length a little greater than the width at base. Furrows shallow and often indistinct: occipital furrow narrow and shallow; occipital ring comparatively wide, flattened on the top, a little higher than the base of the glabella; dorsal furrow shallow, and continued in front of the glabella.

Facial suture making a gentle curve outwardly from where it cuts the contour in front, and thence nearly straight to the anterior margin of the palpebral lobe, and slightly curving outwards again returns beneath the eye, almost to the dorsal furrow, and then turns very abruptly outwards.

Fixed cheeks very narrow, spreading a little in the middle, and separated from the elongate palpebral lobe by a shallow groove: posterior limb narrow. Frontal limb extended, with a shallow depression close to the glabella, beyond which it is very gently convex and rounded at the extremity.

This species is peculiar, and very well marked in the curving anterior margin of the frontal limb, the elongate palpebral lobe, and the shallow narrow dorsal furrow, which is sometimes scarcely distinct.

Associated in the same specimens with these glabellæ there are several movable cheeks and other parts of the body, which may belong to this species. All the cheeks have the facial suture terminating at some distance within the posterior angle, which is extended in a long curving spine. The

inner angle is marked for a very large eye-tubercle, corresponding to the elongate palpebral lobe.

A single pygidium in the same association has a short elevated axis, with only two or three rings visible : the lateral lobes are somewhat flat, marked by about three ribs which terminate in a broad flattened border. Some separated articulations of the lateral lobes of the thorax are marked by a broad groove gradually narrowing to the distal extremity, which is obtuse.

This species occurs in a ferruginous sandstone, above the lowest trilobite bed on the shores of Lake Pepin. In a single specimen, of five inches square, there are at least a dozen individuals. The glabella and cheek of Plate vii, figs. 45 & 46, are from this specimen. The small specimen, Plate viii, f. 29, is from a different layer, at Trempaleau.

CONOCEPHALITES PATERSONI (n. s.).

PLATE VII. FIGS. 45 & 46.

Glabella ovate conical, depressed convex and slightly subangular along the median line, rounded in front, slightly contracted opposite the eye-lobes, a little longer than its width at the base; marked by three shallow oblique furrows which are faintly impressed in the mould, the anterior one being near the front of the glabella. Occipital furrow slightly impressed at the sides, and not visible in the centre : occipital ring narrow at the sides, wider and more elevated in the middle (but without appearance of a spine). Dorsal furrow shallow, faintly impressed at the sides, and, in old specimens, not defined in front of the glabella.

Fixed cheeks narrow in the middle, gradually expanded towards the front, and curving regularly below into the narrow posterior limb : palpebral lobe not preserved in the specimens described ; ocular ridges extending obliquely across the fixed cheeks; frontal limb much extended, nearly three-fourths as long as the glabella, plain and gently curving downwards, a little more prominent in the middle, and without transverse ridges or furrows.

Although but two individuals of this species have been obtained, the characters are so peculiar as to leave no doubt as to its specific distinction. The glabella is scarcely separated from the frontal limb in the larger individual, and the latter is very long and quite free from ridges or furrows, a character not observed in any other species. A similar extent of frontal limb exists in *C. diadematus*, *C. wisconsensis* and *C. hamulus*; but in these it is marked by furrows or ridges, and connected with a different form of glabella which is limited by a frontal furrow.

This species is associated with *Conocephalites anatinus* in a ferruginous sandstone at Trempaleau, Wisconsin.

CONOCEPHALITES? BINODOSUS (n. s.).

PLATE VII. FIG. 47.

A small pygidium occurring in the sandstone at Osceola mills, differs from any of those before noticed. The axis is short, strong, and abruptly elevated, with three rounded annulations besides the terminal one, which is marked by two distinct nodes : these nodes may have been spines in the original crust. Lateral lobes with three ribs besides the anterior one : ribs divided by a groove.

The cheek, fig. 48, was found in the same association.

Up to this time, no glabella of CONOCEPHALITES has been found in the specimens from Osceola mills, and the pygidium is referred to that genus on account of its similarity to some in the preceding group of species. The pygidium associated with *C. perseus* is slightly binodose on the posterior annulation, but its form and the proportions of its parts are very different.

There are, besides those above described, a group of species with a moderately convex (rarely more prominent) glabella, which in some of them is angular along the middle, with faint glabellar furrows. In several of the species, the facial suture apparently cuts the anterior border at a distance from the apex ; and with narrow fixed cheeks, they have a prominent palpebral lobe limited by a distinct groove, while the posterior limb of the fixed cheek is comparatively narrow. These species might be referred to DIKELOCEPHALUS, but for the conical glabella, and obscure furrows which do not extend entirely across it. Three of the species which appear to be thus related, have been designated by Dr. OWEN respectively as DIKELOCEPHALUS, LONCHOCEPHALUS and CREPICEPHALUS. Should a separate designation be required for these, I would suggest the adoption of the generic name LONCHOCEPHALUS.

The species bearing the characters above indicated are the *Conocephalites winona*, *C. iowensis*, *C. wisconsensis*, *C. hamulus* and *C. diadematus*.

The last-named species has a more prominent glabella than the others, and is more strongly marked by the glabellar furrows, while the palpebral furrow is less distinct. The *C. iowensis* presents some distinctive features which may render necessary its ultimate separation from the genus.

CONOCEPHALITES WINONA (n. s.).

PLATE VII. FIGS. 26 – 28.

Compare *Conocephalites chippewaensis* (=? *Lonchocephalus chippewaensis*, Owen); Shumard in Trans. Ac. Sciences of St. Louis, Vol. ii, p. 104.

Head small. Glabella cylindrico-conical, sides gently curving towards the front which is regularly rounded, sharply truncate behind by a straight narrow occipital furrow: glabellar furrows obscure or obsolete. Occipital ring rounded, lower than the glabella, narrow at the sides, and produced in the middle. Dorsal furrow abrupt, strongly defined at the sides and little less strongly in front: cheeks abruptly rising from the dorsal furrow, rounded above, and extended in the direction of the palpebral lobe. Frontal limb a little depressed below the plane of the cheeks adjacent to the glabella, and marked by a sharp transverse groove which is little less distinct than the dorsal furrow; and anterior to this the margin is elevated as high or higher than the part behind the groove. A slight central longitudinal groove or depression extends across the posterior part of the frontal limb, from the dorsal furrow to the frontal furrow.

Associated with numerous specimens of the glabella and fixed cheeks are many fragments of movable cheeks, and one or two nearly entire. The cheek is small, rather flat, with a strong thickened rounded border, which is prolonged into a spine as long as the body of the cheek. Eye large, semilunar, and abruptly elevated from the cheek.

Caudal shield (of this species?) nearly semielliptical, a little curved on the anterior margin: axis abruptly elevated, rounded, marked by about five annulations including the terminal one. Lateral lobes depressed convex, having three flattened simple ribs besides the anterior one, all terminating in a narrow flattened border.

One of the most marked features of this small species is the abrupt termination of the glabella behind; the lower angles not being rounded, while the occipital furrow is very trenchant. The glabella is less gibbous than in *C. minor*, and does not slope to the occipital furrow: the occipital ring is narrower, not triangular, and less produced posteriorly; the cheek is narrower, the border stronger, and the eye larger. In the caudal shield, the axis is more prominent, the lateral lobes more convex, and the ribs less elevated without perceptible grooves.

This species is associated with *C. iowensis*, Obolella? and Lingula, on the banks of the Mississippi opposite the mouth of the Black river, in specimens received from Dr. Shumard.

CONOCEPHALITES IOWENSIS.

PLATE VII, FIGS. 29 – 33; AND PLATE VIII, FIGS. 10 – 12, & 30.

Dikelocephalus iowensis : OWEN, Geological Report of Wisconsin, Iowa and Minnesota, page 575, Tab. I, f. 4, and Tab. I A, f. 13.

Conocephalites iowensis : SHUMARD, Trans. Acad. Sciences of St.Louis, Vol. ii, p. 104.

Dr. SHUMARD also gives the following synonymy :

Crepicephalus : OWEN, Ibid. Tab. I A, f. 10, 16 & 18.
Undet. Trilobite : ID. Ib. Tab. I A, f. 11.
Lonchocephalus : ID. Ib. Tab. I A, f. 15.

THE species is of medium or large size. Head depressed convex. Glabella truncate conical, moderately convex, the centre sometimes more elevated and longitudinally subangular in the middle, a little flattened on the sides, the length (excluding the neck-segment) equal to the width at the base, truncate in front, with the angles abruptly rounded : lateral furrows obscure, and apparently not existing in younger specimens. Occipital furrow linear, rather shallow in the middle, deeper and sharply impressed towards the extremities. The occipital ring has the same elevation and convexity as the base of the glabella, wider in the middle, straight on the anterior edge, and converging on the posterior margin from the middle to the extremities. Dorsal furrows strongly but not abruptly impressed at the sides, and at the anterior angles of the glabella : the groove in front of the glabella is more shallow than at the sides.

FIXED cheeks rising gently from the dorsal furrow, moderately convex, not as high as the glabella. Posterior limb with a well defined furrow : palpebral lobes long reniform, and "separated from the cheeks by a strong sigmoid furrow." Frontal limb about one-fifth of the entire length of the head ; "having a deep transverse groove a little in advance of the middle," with a strongly elevated and rounded or "cordlike" anterior margin.

MOVABLE cheeks comparatively small, narrow elongate, with a thickened border which is prolonged into a slender spine. Eye tubercle large.

THORACIC articulations of moderate strength ; having a simple groove which becomes gradually narrower towards the outer end, and dies out at the commencement of the recurving extremities.

PYGIDIUM subquadrilateral, with strong but slender diverging spines from the posterior angles. The axis and lateral lobes, without the expanded border, are semicircular; the axis somewhat abruptly elevated, with five annulations : lateral lobes with five segments, including the anterior one. The border extends from the extremity of the anterior segment in a direction nearly vertical, or slightly expanding downwards : the posterior edge of the border extends below the termination of the axis about one-fourth the entire length of the pygidium.

The measurements of three individuals give following dimensions :

	I.	II.	III.
Length of glabella in front of occipital ring ..	.23 in.	.46 in.	.63 in.
Width of glabella at base..................	.20	.47	.60
Width of glabella at apex..................	.13	.28	.37
Length of frontal limb	.09	.15	.18
Entire length of head.....................	.37	.71	.94

The proportions continue very nearly in all the parts except the frontal limb, which, in the larger one, has but twice the length of the smaller one, while the other parts are about three times as great. Since we find similar fragments of thoracic segments, and portions of the pygidia associated in the same specimens with the glabella, I can have no doubt of their identity with *C. iowensis*.

The illustrations on Plate viii, f. 10–12, are from Trempaleau, and are of the largest individuals found there. Subsequently Dr. SHUMARD has sent to me specimens of the glabella and fixed cheeks of several individuals from Black river, which are much larger. These are illustrated on Plate vii, f. 30.

At the mouth of Root river this species occurs of much larger dimensions than the specimens of Trempaleau, and considerably larger than those from the Black-river locality. The Root-river beds are apparently somewhat higher in the series than those of Trempaleau or Mountain island; but beyond this and one other species, I have not identified fossils from that locality.

The *C. iowensis* is a well-marked and very characteristic species of the lower fossiliferous beds of the Potsdam sandstone.

Dr. SHUMARD remarks that "this species may be readily distinguished from the *Crepicephalus* [*Conocephalites*] *wisconsensis*, OWEN, to which it is somewhat nearly allied, by its wider and more conical glabella, and much narrower front margin."

This fossil occurs with *Conocephalites minor*, LINGULA, OBOLELLA? and THECA, at Trempaleau; and in a similar association, near the mouth of Black river in Wisconsin. The larger specimens, from Root river, are associated with fragments of Trilobites, among which no other fossils have been observed.

CONOCEPHALITES WISCONSENSIS.

PLATE VII, FIGS. 39–41; AND PLATE VIII, FIGS. 22, 23, 24, 27 & 28.

Crepicephalus? wisconsensis : Owen, Geological Report of Wisconsin, Iowa and Minnesota, Tab. 1, f. 13. (The upper figure on the specimen, the lower figure being *Dikelocephalus granulosus.)*

Compare *Dikelocephalus latifrons* : Shumard, Trans. Acad. Sciences of St.Louis, Vol. ii, p. 101.

Head large. Glabella strong, truncato-conical, moderately convex, sometimes subangular in the middle, width at base nearly equal to the length; front usually straight, sometimes a little curved; sides nearly straight and regularly converging : the posterior glabellar furrow oblique, and faintly marked; the middle one less distinct; the anterior one sometimes obscurely indicated near the anterior extremity of the glabella. Occipital furrow strongly impressed at the sides, but often faintly marked or scarcely perceptible in the middle. Occipital ring narrow at the sides, wider and inclining backwards in the middle, and rising to the base of a strong elevated spine, which is directed obliquely backwards, and in the course of its length is gently curved. Dorsal furrow well defined, not deep, a little more strongly impressed at the anterior angles of the glabella, and continued in front of the same strength as at the sides.

Facial suture curving slightly outwards from the frontal margin, and then gently curving towards the glabella at the anterior angle of the palpebral lobe, which is a little forward of the middle glabellar furrow; thence curving to the base of the eye, it is directed outwards.

Fixed cheeks narrow, with a narrow posterior limb; the palpebral lobe limited by a distinct groove : frontal limb much extended, and gently curving at the sides; the anterior border, for about one-third or nearly one-half its entire length, longitudinally flattened and ascending to the anterior margin, with a wide shallow furrow between it and the posterior gently convex portion of the limb. The shallow frontal furrow and posterior part of the limb are sometimes visibly striated, with flexuous interrupted lines which converge towards the glabella; and the bottom of the groove, in the cast, is sometimes marked by a row of granules or minute tubercles.

The wide frontal limb and strong curving spine of the occipital ring are characteristic features of this species. The glabella approaches in form that of *C. iowensis;* while the frontal limb of that species is much narrower, and the fixed cheeks are wider and more elevated.

A movable cheek (Plate vii, f. 41), occurring in the same association (and with scarcely any fragments of other fossils), I have referred to this species with doubt.

There is also a pygidium in the same specimens, which I have referred to this species. It is more than twice as wide as long; the axis is conical, abruptly elevated, and marked by six annulations besides the anterior articulating joint. The sides are nearly flat, and marked by four ribs which are flattened and faintly grooved.

Dr. SHUMARD has very kindly sent me a specimen of the species described by him as *Dikelocephalus latifrons*, consisting of the large frontal limb and the principal part of the glabella (Plate vii, fig. 40). On comparison with seven or eight individuals of the species which I have identified with *Crepicephalus? wisconsensis* of OWEN, I can find no characters which separate the two. From its conical glabella and oblique furrows, I place it with CONOCEPHALITES. It is clearly related generically to *Lonchocephalus (Conocephalites) hamulus* of OWEN.

The great width of frontal limb shown in Dr. OWEN's figure of *Crepicephalus wisconsensis* is a character not possessed in an equal degree by any other species except *Conocephalites hamulus*, and, approximately, by *Conocephalites diadematus*. The contour of the limb in the two last is different from that of the figure of Dr. OWEN, which corresponds with the specimens I have referred to that species. In the figure cited (Tab. I, f. 13), the frontal limb is equal in length to the width of the glabella near the front; a feature which corresponds with the specimens I have figured, and with others of the same species. In the specimen of Dr. SHUMARD, the length of the frontal limb is proportionally a little greater; but I do not regard this difference as of specific importance.

PLATE VII.

FIG. 39. The glabella and fixed cheeks of a small individual.

FIG. 40. The frontal limb and part of the glabella of a large individual, showing radiating striæ on the frontal limb. This figure is from Dr. SHUMARD's specimen.

FIG. 41. A cheek (associated with the glabella at Trempaleau), showing the direction of the facial suture in its posterior extension.

PLATE VIII.

FIG. 22. The glabella, preserving part of the fixed cheeks, frontal limb, and posterior spine.

FIG. 23. Profile of the same.

FIG. 24. Pygidium associated in the stone with the specimen fig. 22, and several other similar ones.

FIG. 27. A smaller specimen, presenting some slight variations from the preceding figure 22.

FIG. 28. Profile of the same.

This species occurs at Trempaleau, Wisconsin, and opposite the mouth of the Chippewa river in Minnesota, associated with *Ptychaspis granulosa*, *Agnostus josepha*, etc., in beds that I have recognized as the second fossiliferous group of the sandstone. The locality of Dr. OWEN's specimen is not given; but from its association with *Ptychaspis (Dikelocephalus) granulosus*, I infer it to have been from near Trempaleau.

CONOCEPHALITES HAMULUS.

PLATE VII, FIGS. 43 & 44; AND PLATE VIII, FIGS. 25, 26.

Lonchocephalus hamulus : OWEN, Geol. Report Wisconsin, Iowa and Minnesota, page 576, Tab. I A, f. 8 & 12.

THE glabella, frontal limb and fixed cheeks, without the posterior limb; form a suboval figure, which is concave on the sides (fiddle-shaped).

GLABELLA subtruncate conical, narrow, the length greater than its width at the base, subtruncate or slightly rounded in front: furrows very obscure, moderately convex, and sometimes subangular along the middle. Occipital furrow not deep, well marked at the sides, and shallow or obsolete in the middle: occipital ring wider in the middle, elevated above the base of the glabella, and produced into a long slightly arcuate spine.

FACIAL suture cutting the anterior margin in a nearly vertical line from the inner margin of the palpebral lobe; thence, making a gentle curve outwards, it returns to the same line just in advance of the eye, and thence to the posterior edge of the palpebral lobe, leaving a very narrow posterior limb, the extent of which is unknown. Frontal limb extended about two-thirds as long as the glabella, depressed convex on its posterior half; thence gently curving downwards towards the front, it is marked a little in advance of the middle by a low ridge, on each side of which is an undefined furrow, leaving the anterior border a little narrower than the posterior convex portion.

This species differs from the *C. wisconsensis* in the less lateral extension of the frontal limb, the narrow subcentral transverse ridge and shallow furrows, and in the proportionally longer glabella.

PLATE VIII.

FIG. 25. The glabella and part of the fixed cheeks, with frontal limb and posterior spine.

FIG. 26. Profile of same.

The remarkable spines, which occur in the same association, are represented on Plate VII and on Plate XI, figs. 5 & 6. These appear more like cheek-spines than glabellar spines; but it is still impossible to assign to them their true relations, with our present knowledge of the parts of trilobites occurring in the same association. In some forms or conditions, as fig. 44 of Plate VII, we might suppose them to be cephalic spines; but in the condition of fig. 6, Plate XI, we cannot so readily assign them a place; and this question becomes still more difficult of solution when we find them in the condition of fig. 5, where there is an expansion like a part of the cheek within the curve of the thickened border. These spines do not represent the posterior spines of the cheeks, for they have no groove on the

upper side, or evidence of infolding of the crust on the lower side; but the thickened parts near the base are rounded above, slightly flattened below, and longitudinally striated, with that extremity sharply truncated as if by a suture. In the specimen fig. 5 there is, on what may be the posterior side, a narrow thickened border not unlike a cheek-border, with the impression of a thin expanded crust resembling a cheek-shield irregularly broken off along the inner margin.

We might suggest that the spine, like fig. 5, proceeded from the middle or anterior part of the movable cheek, near the facial suture, curving outwards and backwards; and that the expanded crust within the thickened curving border below (which is broken on its inner margin) is a part of the cheek-shield near the posterior angle.

Although Dr. Owen has referred these spines to the same species with the glabella which he denominated *Lonchocephalus hamulus*, I have no evidence of such relation of the two fossils. While the spines are extremely numerous, the glabella (Plate viii, fig. 25, and Plate vii, fig. 43) is comparatively rare: neither do they seem related by the strength and proportions of the parts; for the glabella, frontal limb and occipital spine are comparatively slender, while the separated spines indicate a more robust animal.

The glabella is known only in the greenish gray sandstone beds at Miniska, where it is associated with the spines as described by Dr. Owen. Spines of the same character occur in the greenish and compact ferruginous sandstones at Trempaleau, much more numerously than at Miniska; but the glabella has not been found in the same association.

CONOCEPHALITES DIADEMATUS (n. s.).

PLATE VII, FIGS. 36 – 39; AND PLATE VIII, FIGS. 18 & 21?

Head broad, moderately convex, with widely extended cheeks and frontal limb.

Glabella prominently convex, subovate-conical, about five-sixths as wide at base as its length from the occipital furrow, rounded or slightly subtruncate in front. Posterior furrow turning obliquely backwards; middle furrow less strongly marked; anterior furrow still less conspicuous, and in small specimens not distinguishable; occipital furrow shallow, well defined, and bending a little forward toward its extremities: occipital ring flattened, having the same elevation as the glabella, and of nearly equal width throughout. Dorsal furrow shallow, defined, little depressed below the plane of the fixed cheeks, which are flattened and much below the convexity of the glabella: the furrow is continued, though less strongly defined, in front of the glabella.

Fixed cheeks flat, half as wide as the glabella. In the larger spe-

mens, a distinct ocular ridge extending from the palpebral lobe in the direction of the front of the glabella : posterior limb unknown. Frontal limb much expanded, with a narrow flattened space beyond the groove, and, rising abruptly, it spreads in a broad flattened border which is apparently not thickened upon its margin.

A movable cheek in the same association is elongate triangular, with a large ocular sinus : the posterior angle is produced into a long curving spine; the body of the cheek is convex, with a wide flattened border.

The measurements of the head are as follows : Length of glabella anterior to the occipital furrow, 0·36 of an inch; width at base, 0·30; width at the anterior end, 0·24; entire length of head, 0·61; frontal limb, 0·18 of an inch.

A pygidium, fig. 21, found in the specimens from Marine mills, which appears to be too large for any individual of *C. oweni*, I suppose may belong to this species. It is more than twice as wide as long; the axis abruptly elevated, and marked by six annulations, including the anterior one; the lateral lobes are nearly flat, and marked by three divided ribs besides the anterior one, all terminating in a flattened border. A single specimen, larger than this one, has been seen.

PLATE VII.

Fig. 36. The glabella and part of the fixed cheeks, showing ocular ridges. (The specimen is of medium size, from Marine mills.)

Fig. 37. A part of a larger head, with the glabellar furrows more strongly marked.

Fig. 38. A cheek associated with fig. 37, and probably of the same species. The figure shows the course of the facial suture and the extension of the border on the lower side, which reaches beneath the frontal limb.

PLATE VIII.

Fig. 18. A glabella and frontal limb, in which the space between the front of the glabella and the elevated border is much narrower than in the other specimens.

Fig. 21. A pygidium which occurs in the same association.

This species is comparatively rare : a few individuals occur in some specimens from the Marine mills on the St. Croix river, with large numbers of *Conocephalites oweni*. It is very distinct from any other, in the depressed flattened area just forward of the glabella, and the abrupt elevation and flattened anterior border. There is considerable diversity of expression given to this species, from the greater or less extent of the depressed flattened portion of the limb in front of the glabella, and also from the imperfection of the anterior border of the limb, which sometimes leaves it little wider than the posterior flattened space.

I have collected the same species on the west side of the St. Croix river, about two miles below the Falls.

GENUS ARIONELLUS (BARRANDE).

ARIONELLUS BIPUNCTATUS.

PLATE VII. FIGS. 50 & 51.

Arionellus bipunctatus : SHUMARD, Trans. Acad. Sciences St. Louis, Vol. ii, No. 1, p. 101.

The following is Dr. SHUMARD's description of this species :

" SMALL, moderately elevated. Glabella convex, conical, truncated " or sometimes very gently arched at apex : length, excluding " the neck-segment, equal to the width at the base ; sides gently " convex ; neck-furrow straight, moderately deep and well de- " fined ; neck-segment short, semielliptical, with the sides gently " rounded. Dorsal furrows distinct all around, as deeply im- " pressed as the neck-furrow, and marked opposite each angle " of the glabella in front with a minute circular depression. " No lateral furrows visible on any of the specimens under " examination. Front margin rounded, and occupying about " one-fourth the total length of the head.

" MOVABLE cheeks regularly convex, margined with a narrow " rounded raised border : genal angles prolonged into long " slender curved spines.

" LENGTH of head, 0·22 of an inch ; length of glabella, 0·16 ; " greatest width, 0·11. The general contour of the head of this " species, when deprived of the movable cheeks, reminds one " of the head of *Homolonotus delphinocephalus*."

Through the kindness of Dr. SHUMARD, I have received specimens of this pretty little species. In the form of the glabella, it resembles some of the smaller species of CONOCEPHALITES ; but the direction of the facial suture, and the form of the palpebral lobe, are distinguishing features. At the same time, the form of the associated movable cheeks is not unlike many of those which occur with, and are referred to the smaller species of CONOCEPHALITES, while the fragments of thoracic segments are likewise of similar character.

The minute depressions, or puncta, at the anterior angles of the glabella, are well preserved in many specimens, while the occipital ring often bears a small obtuse spur. The minute pits in front of the glabella are well marked ; but these are not peculiar to this species.

I follow Dr. SHUMARD in placing this species under ARIONELLUS, though it appears to me distinct from that genus, and not generically different from some of the preceding species.

From the associated fossils, I infer that this species occurs about the middle of the sandstone, "near the mouth of Lawrence creek, a small tributary of the St. Croix river, Minnesota ;" and from the mouth of Root river in Minnesota, in the same horizon.

In his Report on Wisconsin, Iowa and Minnesota, Dr. Owen has described (on pp. 374 & 375) the *Dikelocephalus miniscaensis* and *D. granulosus*. From specimens collected at the same localities, I have recognized these species so distinctly as to leave no doubt of their identity. While possessing some characters of glabella in common with typical species of Dikelocephalus, there are other features which appear to me quite incompatible with that genus. The fixed cheeks are wider, and the facial suture has a different direction, while the movable cheeks are equally distinctive in their form and in their posterior extension. The surface-marking in both species, but particularly in *D. granulosus*, is very peculiar, and unlike anything known in typical species of Dikelocephalus. I have found it necessary, therefore, to separate them from the latter genus. At the same time there is equal difficulty in referring them to any established genus, so far as I have access to published scientific works. I therefore suggest a distinct generic term that may include these two species, which, from present knowledge, I regard as similar generic forms.

GENUS PTYCHASPIS (n. g.).

[Gr. πτυχη, *plicatura; ασπις, scutum.*]

Head broad and strong, with wide depressed-convex cheeks. Glabella cylindrical, convex, deeply lobed or transversely furrowed, very prominent in front. Eyes anterior to the middle. The facial suture cutting the anterior border at a point between the eye and the glabella, or almost in front of the eye; and from below the eye it proceeds obliquely and in a slightly curving line to the base, at a point near to, or a little without the centre of the cheek, leaving the movable cheek of nearly the same dimensions as the fixed cheek. Movable cheek subtrapezoidal, with a strong thickened border, which is extended into a spine. Eyes unknown. Palpebral lobe, in one species, small.

The general direction of the facial suture is similar to that of Arionellus; but the eye is more anterior, though of the same form. The strongly lobed cylindrical or subcylindrical glabella is a very distinctive feature. Thorax with strong articulations, the axis elevated, and the annulations marked by a broad node at their extremities : ribs marked by a subcentral groove, and angularly bent backwards near the middle. Pygidium somewhat parabolic; the axis strong and elevated, marked by several annulations, and the lateral lobes by divided ribs.

The surface of the front of the glabella, the fixed and movable cheeks, in one species, are strongly and peculiarly lamellose-striate; and in the other known species, the cheek-borders are grooved, with angular striæ or ridges between them.

The imperfection of the specimens is such that the generic description must remain incomplete, until more satisfactory material can be obtained.

PTYCHASPIS MINISCAENSIS.

PLATE VI, FIGS. 41 – 46; AND PLATE X, FIGS. 21 & 22.

Dikelocephalus miniscaensis : Owen, Geol. Report Wisconsin, Iowa and Minnesota, page 574, Tab. 1, f. 3 & 12; and Tab 1 A, f. 4 & 5.

Head large and strong, with broad cheeks having a thickened and striated border, which is produced in a short triangular spine behind.

Glabella large and strong, very convex, somewhat semicylindrical, about three-fourths as wide as long, the width at the anterior end about one-fifth less than the width at its base, rounded or subtruncate anteriorly, marked by two pairs of furrows; the posterior pair extending obliquely and deeply about one-third across the glabella, and connected by a straight transverse furrow. The second pair of furrows are shallow, oblique, and in older specimens can be traced about one-third across the glabella. In older specimens the anterior lobe occupies about one-half the length of the glabella, while in younger ones it is scarcely more than one-third the length. The occipital furrow is strongly defined; the occipital ring strong and prominent, and of nearly equal width throughout. Dorsal furrow strongly defined, and continued in front of the glabella.

Fixed cheeks comparatively wide.

Facial suture vertical from the contour line in front to the inside of the palpebral lobe; thence turning a little outwards, it comes to the posterior margin halfway between the dorsal furrow and the outer margin of the movable cheek. The frontal limb is somewhat abruptly convex from the furrow, but never rises nearly so high as the frontal lobe of the glabella, and is abruptly bent downwards to the anterior margin. Eyes unknown.

Movable cheek large, somewhat trapezoidal : the outer limb is extremely thickened, with a few coarse longitudinal striæ preserved in the cast, extended behind, and uniting with the thickened posterior border, it forms a spine three-fourths as long as the body of the cheek. Within the thickened border there is a distinct groove, which is not quite united with the groove of the posterior limb.

THORAX strong; axis elevated, and the extremities of the annulations swelling into nodes : ribs strong, grooved in the middle, and bent somewhat angularly backwards in the middle. The anterior facette is abruptly turned inward.

Associated with the glabellæ and cheeks, there are several pygidia which appear to belong to the same species. The specimen fig. 46 is somewhat paraboloid, the axis strong and rounded, and marked by about four very convex rings : the dorsal furrow is deeply impressed by the lateral lobes rising abruptly, and becoming quite convex in the middle, and thence curving downwards to a narrow flattened border; marked by three ribs and an obscure fourth one, which are grooved from near their origin to the flattened limb.

This species is common, and even abundant in some beds of greenish gray sandstone at Trempaleau, and near the mouth of the Miniska river. It is chiefly associated with *Ptychaspis (Dikelocephalus) granulosa* of OWEN.

This is unquestionably identical with the glabella figured by Dr. OWEN, Loc. cit., Tab. 1, f. 3 *a* & 12; and Tab. 1 A, f. 5. The pygidium (Tab. 1, f. 3 *b*) likewise corresponds with that figured Plate vi, f. 46; the former being a somewhat larger individual.

The glabella of the young of this species bears some resemblance to the glabella of the more convex forms of *Dikelocephalus pepinensis*; but the posterior furrow is more oblique, and the second furrow more conspicuous, while the contour in front is more curved. It likewise resembles, in some of its phases, the *D. spiniger*; but the frontal limb of this is nearly straight, and the glabella is more truncate, while the glabellar furrows very nearly correspond. The form of the fixed cheek, however, distinguishes it at once from either of these, as well as from others of that genus. In young specimens, the glabella resembles very closely that of *Ptychaspis (Dikelocephalus) granulosa* of OWEN; but the second glabellar furrow in that species is continued across the glabella, and the posterior lobes are marked by a small tubercle at their extremities, while the front contour is distinctive.

Although referred by Dr. OWEN to the Genus DIKELOCEPHALUS, this species differs in having the sides of the glabella not parallel throughout, but more particularly in the form of the fixed cheeks, in the movable cheeks, and in the character of the palpebral lobes.

PTYCHASPIS GRANULOSA.

PLATE VI. FIGS. 33 – 40.

Dikelocephalus granulosus : OWEN, Loc. cit., page 575, Tab. I, f. 7 (and 5?).

HEAD broad, with a narrow frontal border and wide cheeks.

GLABELLA narrow, prominent, semicylindrical, of nearly equal width throughout, or sometimes a little wider in front than in the middle; marked by two strong transverse furrows which reach entirely across : the posterior one is a little oblique at the extremities, and straight in the middle; the second one is direct, or scarcely curving. The posterior lobe is wider, slightly bent forward, and subnodose at its extremities; while the extremities of the second annulation are slightly curved forward, but not expanded. At the extremities of the posterior annulation, and separated from it by an indentation, there is on each side a small node lying nearly in the line of the dorsal furrow.

OCCIPITAL furrow strongly marked, straight in the middle, slightly curving forward at the extremities, and continued in the fixed cheeks : occipital ring narrow, prominent, and rising above the convexity of the glabella. Dorsal furrow strongly defined, slightly interrupted behind by the little nodes before mentioned. The frontal limb is depressed, a little convex in front of the furrow, and bent abruptly downwards.

THE fixed cheeks rise abruptly from the frontal limb, to a prominence continued from the palpebral lobe to the dorsal furrow; the principal part of the area from the eye backwards being depressed convex, and produced into an angular termination at the extremity of the posterior limb. Surface strongly striate.

The surface characters are rarely seen in the casts; but in the impressions in the sandstone, they may be detected. The peculiar form of the glabella and fixed cheeks, the anterior position of the eyes, and strongly furrowed glabella with prominent rounded anterior lobe, are characters which readily distinguish this species from any other, except the young of *Ptychaspis* (*D.*) *miniscaensis*.

Dr. OWEN has given the following

" *Specific character*. This species is distinguished particularly by
" the glabella and cheek-plates, as far as they are preserved,
" being studded with minute granules. The glabella is divided
" by three furrows into four segments : the posterior segment
" terminates on either side in two obscure basal tubercles."

Strictly this description does not apply to the specimens; but I suppose the occipital furrow to be one of the three furrows mentioned, while the "posterior segment" terminating "in two obscure basal tubercles" can apply to the slightly tuberculated extremities, and the small tubercles at the extremities of the posterior lobes of the glabella.

FIG. 33, is from a cast taken in a mould of the exterior surface, showing the striations; but the eye-lobes are not visible (figure enlarged).

FIG. 34, is from a cast of the interior in sandstone.

FIG. 35, a profile of the same.

FIG. 36. An enlarged figure from a small head of this species.

FIG. 37. A cheek of this species.

FIG. 38. Profile or lateral view of the same.

FIG. 39. A part of a thoracic segment.

FIG. 40. A pygidium found associated with this species, the form of which corresponds to the one figured by Dr. OWEN, Tab. 1, f. 5.

This species occurs in the greenish gray beds of Trempaleau and Miniska, in the central portion of the series, associated with *Ptychaspis miniscaensis;* and in gray beds a little lower in the series, associated with *Agnostus josepha, Conocephalites wisconsensis* and *C. anatinus.*

PTYCHASPIS (sp.?).

PLATE VI. FIG. 48.

The figure (Plate vi, fig. 48) is about three times enlarged, from a small specimen which possesses the characteristics of this genus.

It appears to be an entire head, but no facial suture or eye-tubercle can be distinguished. It is possible that it may be the very young of *P. miniscaensis,* which, in all the smaller specimens, approaches the *P. granulosa* in its appearance. With a single specimen, I hesitate to characterise it as a distinct species.

It occurs in the sandstone at Trempaleau, associated with *P. granulosa* and *Agnostus josepha.*

GENUS CHARIOCEPHALUS (n. g.).

[Gr. *χαρις, gratia; κεφαλη, caput.*]

Head broad; cheeks moderately convex towards the eyes; glabella regularly convex, and marked by transverse furrows; eyes large; facial suture cutting the contour of the front at or near the centre. Thorax unknown. Pygidium?

CHARIOCEPHALUS WHITFIELDI (n. s.).

PLATE VI, FIGS. 47 – 51; AND PLATE X, FIG. 20.

Head wide, with gently convex cheeks.

Glabella regularly convex, the sides rising rather abruptly from the depression, semielliptical, rarely appearing a little truncate in the front, and in the cast of the interior entirely smooth, or faintly marked by two pairs of furrows, the posterior one of which has rarely been seen to extend across the middle. Occipital furrow shallow, gently depressed : occipital ring depressed-convex. Dorsal furrow rather broad and well defined, contined in front of the glabella in nearly the same strength as at the sides; and just within the contour of the front, it is marked by two minute rounded pits.

The facial suture cuts the contour of the head at or near the middle of the front, and, making a gentle convex curve, it approaches the glabella just anterior to the eye-lobe, and following the curve of the latter to its posterior limit, continues in a gently diverging line to the base of the cheek halfway between the dorsal furrow and the outer margin.

Fixed cheeks narrow, suddenly contracted in front of the eye, and gently expanded towards the palpebral lobe, and extended in a comparatively short posterior limb. The frontal limb is narrow, convex, sublunate or sometimes sublinear and straight.

Movable cheeks with a regular circular curve from the front to the beginning of the spine at the posterior angle : the lower part of the cheek is wide, gradually narrowing anteriorly, with the border reaching to the centre of the front of the head. The inner angle shows a large ocular sinus. The posterior limb is extended into a straight diverging spine. The surface is gently convex towards the eye, gradually depressed to a broad shallow groove, which leaves a thickened border of the same width.

This species is not uncommon in the friable greenish gray sandstone at Trempaleau, and in some associated magnesian beds. It is readily distinguished from all the other species by its narrow frontal border, and the contraction just anterior to the eye. The movable cheek differs from the others in the circular curving of its outer limb.

In its facial suture it approaches the Genus ARIONELLUS, and some separated thoracic segments in the same association are similar to those of that genus. The character of the palpebral lobe, with the large eye and form of cheek, are distinctive.

GENUS ILLÆNURUS (n. g.).

BODY robust, broadly elliptical : head short, convex, semielliptical, the front and sides regularly rounded and nearly straight behind.

GLABELLA subquadrate, convex, smooth, without distinct dorsal furrow : palpebral lobe marginal. Cheeks wide.

FACIAL suture nearly vertical, slightly diverging anterior to the eye.

MOVABLE cheeks wide and short.

THORACIC articulations moderately convex, with a wide central and narrow lateral lobe. Pygidium short, narrow, subelliptical, convex in front and more curved behind.

The similarity of this fossil to ILLÆNUS is manifest in all its parts; but the quadrate form and narrowness of the central part of the head, and the great lateral extent of the cheeks, offer some differences, which, regarding its primordial associations, I have thought it worth while to consider. The name proposed sufficiently indicates its relations with ILLÆNUS.

ILLÆNURUS QUADRATUS (n. s.).

PLATE VII. FIGS. 52 – 57.

HEAD broad, semielliptical. Glabella convex, a little longer than wide, without visible occipital or dorsal furrow; a scarcely perceptible groove along the posterior margin; the width a little greater behind than before; sides concave; palpebral lobes marginal, a little behind the middle of the glabella.

FACIAL suture cutting the contour of the front a little within, or nearly in, a vertical line drawn through the eye, and making a very gentle concave curve to the outer margin of the palpebral lobe.

MOVABLE cheeks scarcely longer than wide, with a deep sinus below the middle, marking the form of the eye : posterior extremities rounded, and straight upon the posterior margin.

THE middle lobe of the thorax is wide and moderately convex; the lateral lobes narrow, little convex, and the extremities slightly bent backwards, and posteriorly acute. A narrow shallow furrow runs through the middle of the length of the segment.

PYGIDIUM short, convex in front and marked near its margin by a narrow groove, rounded behind.

The specimens observed are the casts of dismembered portions of the body; and occurring in sandstone, it is difficult to determine all the characters. The glabellæ, pygidia and cheeks are preserved in considerable numbers in a fragment of sandstone from near Osceola mills on the St. Croix river, from a position near the middle of the formation.

In more extensive collections made at other localities, no fragment of this species has been observed; and it is, therefore, with probability, inferred that its horizontal range is restricted.

GENUS TRIARTHRUS?

SUBGENUS TRIARTHRELLA (n. g.).

TRIARTHRELLA AURORALIS (n. s.).

PLATE IX. FIG. 13.

A small and obscure species occurs among the DIKELOCEPHALI at Lagrange mountain, which has an elongate semioval glabella, with the fixed cheeks wide and spreading in the posterior limb, and very narrow in front. The glabella shows an obscure indentation at its margin (not so strongly as represented in the figure), and the general expression is like TRIARTHRUS.

The species can hardly be characterized from the imperfect specimens known, some four or five of which have been observed.

FIG. 13. The glabella and fixed cheeks. The figure is twice the natural size of the specimen.

⁂ For notice of a species of CONOCEPHALITES belonging to the first group of species indicated in this paper, see Explanations of Plate VII.

GENUS AGNOSTUS (BRONGNIART).

AGNOSTUS JOSEPHA (n. s.).

PLATE VI. FIGS. 54 & 55.

"*Agnostus orion(?)* BILLINGS" : SHUMARD in Transcations Acad. St.Louis, Vol. ii, p. 105.
Not *Battus* [*Agnostus*] *orion* of BARRANDE, Notice preliminaire, p. 16, 1846 = *Diplorrhina orion*, CORDA, 1847.

HEAD semi-elliptical, a little wider than long; the sides usually curving, sometimes straight for a part of their length, margined by a flattened or concave narrow limb; rather abruptly convex at the sides : the posterior margin, just within the angles, is produced on each side into a short spine.

GLABELLA prominent, narrow, extending about two-thirds the length of the head, and crossed by a shallow furrow near its anterior end : the posterior lobe is marked by an oblique furrow on each side, and a small node on the summit at the anterior termination. The triangular space on each side, between the transverse and oblique furrows, is likewise elevated into a low node. The posterior central portion is gibbous, narrowed at the base, with a small tubercle on each side. A narrow longitudinal furrow extends from the apex of the glabella to the marginal limb.

PYGIDIUM of the same form as the head, or a little wider : axis prominent, subquadrangular, wider than long, nearly one-third the length of the pygidium, bearing a node or short spine on its posterior extremity; sides and body of the pygidium (outside of the axis) highly convex.

In some of the specimens, the sides are a little more straight and parallel than those given in the figures; and in several specimens, a truncation or slight emargination has been observed in the anterior border.

FIG. 54. The head of this species, three times enlarged.
FIG. 55. The pygidium of the same, enlarged in the same proportions as the preceding.

This species is common in some layers of gray sandstone, associated with *Conocephalites wisconsensis* and *Ptychaspis granulosa*, at Trempaleau. It occurs also at the mouth of Black river, and elsewhere on the Mississippi about Lake Pepin.

AGNOSTUS PARILIS (n. s.).

PLATE X. FIGS. 24 & 25.

The two extremities of similar form. The head semielliptical; length and width about equal, very convex in the posterior part, and curving downwards to the anterior margin.

The central portion of the posterior part is limited by a faint curving groove; and anterior to its limit there is a slight elevation, which may have been a node on the surface of the crust. The posterior margin, just within the angles, is produced in a minute node. The marginal rim gradually expands from the posterior angles to the front, where it becomes well defined.

The pygidium is of the same form as the head, slightly truncate at the anterior angles, and the marginal rim narrower towards the articulating border : the central part is slightly more elevated, and limited by furrows diverging from the anterior margin. In the median line, at a point one-third the length from the anterior margin, there is a distinct elongate node.

Fig. 24. The head, about three times enlarged.
Fig. 25. The pygidium, enlarged in the same degree.

This species occurs in a yellowish or light drab-colored sandstone, on the shores of Lake Pepin. It is a well-marked species, and readily distinguished from the others by the shallow grooves on both parts, and the distinct node upon the pygidium.

In the part which I have termed the head, there is some appearance of an elongate glabella in front of the curving groove, but the indications are too faint to be satisfactory.

This species, and the *Agnostus disparilis,* occur in beds near the middle of the formation; while *A. josepha* occurs in beds which are apparently somewhat lower in the series, but the precise relations have not been determined.

AGNOSTUS DISPARILIS (n. s.).

PLATE X. FIGS. 25, 26 & 27.

Head semielliptical, convex towards the posterior side and abruptly sloping to the front; length and breadth nearly as three to four; a little concave on the posterior or articulating margin, and marked near the edge by a narrow groove on each side of the middle, the centre a little elevated close to the margin. The marginal rim is a little wider in front than at the sides.

The specimens are casts of the interior in friable sandstone; and the finer markings, and even any marks of furrows, unless well defined, would not be preserved.

A pygidium? in the same specimen of sandstone is trilobate, a little wider than long. The trilobation extends nearly to the posterior extremity, and is separated from it only by a narrow border. The middle lobe is fully once and a half as wide as the lateral lobe, somewhat flattened on the summit, and very distinctly limited by the dorsal furrows.

In one specimen, the axis appears to be annulated; but in specimens so minute, when the accession or removal of a grain of sand may alter the form and characters of a fossil, it is not easy to decide in regard to the minor features of a species.

It is with some hesitation that I refer the separated parts to the same species; nor can it be decided positively that the trilobate form is the pygidium. The extension of the middle lobe so near to the extremity, offers an objection to regarding it as the glabella.

This species occurs in friable sandstone, with *Dikelocephalus osceola*, at Osceola mills on the St.Croix river.

FIG. 25. The head?, four times enlarged.
FIG. 26. The pygidium? enlarged in the same proportion.
FIG. 27. A specimen enlarged to the same degree; the middle lobe apparently marked by transverse furrows.

The few specimens of a dark rusty-colored sandstone from Osceola mills have proved very prolific of species. Besides those already enumerated, there are, in the same sandstone specimens, undeterminable fragments of other Trilobites; and among them are impressions of parts of the head, which is strongly pustulose, and portions of a pygidium of a very different character from any that have hitherto been noticed. Some fragments of the thoracic segments in the same stone are much larger than any corresponding parts of *Dikelocephalus minnesotensis* which have been seen in the collections, and perhaps belong to a species of that genus.

Whenever this locality, and the region about it, shall be more fully investigated, we may confidently predict that additions of much value and interest will be made to the primordial fauna of the Upper Mississippi valley.

GENUS AGLASPIS (n. g.).

The investigations in the upper part of the Lower sandstone of the Mississippi valley have furnished me with the carapace, some fragments of the thoracic articulations, and what appears to be a caudal spine of a new and remarkable crustacean, for which I have proposed the name Aglaspis.*

Generic description. Carapace wide, sublunate, or approaching semicircular; its superior crust not separable into parts by suture lines; a sinus in the middle of the front, and preserving some evidence of trilobation in the posterior part. Eyes anterior to the middle, large and prominent.

Thorax probably subtrilobate, composed of several articulations, which are recurved at their extremities. Posterior or caudal portion more elevated in the middle and strongly arching : the caudal extremity probably furnished with an elongate spine. Texture punctate.

The only species known, in its carapace reminds one of Limulus; and though the resemblance is not so apparent in the character of the eyes, yet we find that these organs occupy the relative position of the two oculiform spots on the anterior part of the carapace of that animal. The segments of the abdomen, which in that genus are anchylosed, are here free, in their anterior members at least; while the posterior ones are highly arched and closely united. The associated spines, of the same texture as the other parts, can scarcely have had any other relation to the body than the caudal spine of Limulus; and the Aglaspis, with its broad depressed-convex carapace and its anterior eyes, was furnished with a long caudal spine as in the modern genus.

AGLASPIS BARRANDI (n. s.).

PLATE XI. FIGS. 7-16.

Carapace sublunate or semicircular, the diameter at base being more than twice the length; sides moderately convex; the middle more elevated, and showing indications of a trilobate character : front emarginate, or with a distinct sinus; the margin in front and sides limited by an elevated and thickened border, which is slightly extended at the posterior angles. Eyes large, broad-oval, very prominent, situated near together, and

* See Canadian Naturalist and Geologist, Vol. vii, p. 443, December 1862.

anterior to the centre of the carapace. Near the posterior margin of the central division, there are two small pustules.

Several fragments of thoracic articulations have been obtained: these are all recurved, in greater or less degree, at the extremities, without furrows upon the surface. A single segment remains apparently entire : it is highly arched, having an elevation nearly as great as the distance of the extremities. This segment is probably from the posterior part of the body.

A single spine, three inches in length, and a fragment of another similar one, have been obtained. The texture is everywhere minutely punctate, and the surface minutely pustulose.

Fig. 7, is the largest carapace obtained : one side is imperfect, and the opposite angle broken off. The outline on the left is carried out from other specimens, where that part is entire.

Fig. 8, is a smaller carapace, not entire in front; and the centre of the anterior margin is covered by a bit of crust from some other part, or some other individual. This specimen shows the pustules on the posterior margin of the carapace.

Fig. 9, is the inner side of a portion of a small carapace, showing the cavities of the eyes.

Fig. 10. An enlargement of the surface, showing the texture.

Fig. 11. A segment of the body? probably from the posterior part of the animal.

Figs. 12, 13 & 14. Parts of segments? showing the characters of the extremities.

Fig. 15. A portion of a caudal spine of this animal.

Fig. 16. Another specimen of the same appendage.

These remains occur in the upper portions of the sandstone ; and thus far the specimens have been derived from two localities, one near Miniska in Minnesota, and the other near Mazomania in Wisconsin.

This new and remarkable Crustacean is of great interest, since I believe no well-authenticated forms of this class, other than Trilobites, have been found so low in the series of formations. This fossil, moreover, if its relations be such as I have supposed, is of great interest considered in connexion with the Tracks in the Potsdam sandstone, which occur both in Canada and Wisconsin. Whether any relation may exist between the two, remains yet to be proved by farther discoveries of specimens, and also of the locomotive appendages which we may infer that this animal possessed, in character not entirely dissimilar to those of Limulus.

CONCLUSION.

ALTHOUGH I have not been able to recognize the successive Trilobite beds of the Sandstone as indicated by Dr. OWEN, I can nevertheless refer the species here described to three different epochs in the Potsdam period; and I am not prepared at the present time to suggest any farther subdivision. In the lower beds of the formation I have found CONOCEPHALITES proper, together with LINGULA, LINGULEPIS, OBOLELLA? and THECA. In the middle stage, neither the limits of the beds, nor the range of species or genera, have been so well determined; but grouping together all that I have found between the well-defined upper beds and the lower fossiliferous beds known, we have CONOCEPHALITES, DIKELOCEPHALUS, ARIONELLUS, PTYCHASPIS, CHARIOCEPHALUS, ILLÆNURUS and AGNOSTUS, in the trilobitic fauna, together with ORTHIS and PLATYCERAS.

The GRAPTOLITIDÆ apparently begin their existence somewhere in this central epoch, but their precise relations to the other beds have not been determined.

In the higher beds of the formation, and clearly separated from the great central mass, we have the Genera DIKELOCEPHALUS, TRIARTHRELLA and AGLASPIS, together with LINGULA, SERPULITES and EUOMPHALUS.

We observe, therefore, that the earliest trilobites are referable to the Genus CONOCEPHALITES; and the Genus DIKELOCEPHALUS does not apper in the first stages of the formation, nor below the beds which I have referred to the second or middle stage of the period. There this genus appears in three species, smaller and less conspicuous than those in the higher beds. It is only in the later stages of the sandstone, that the typical species of this genus of Dr. OWEN appear; and those from the lower beds, thus referred by him, belong apparently to other genera.

There is much yet to be done in the middle and lower beds of the formation, both in the way of determining the range of species and genera, and in the study of new or imperfectly known species. I believe, however, that the specific and generic relations here indicated may serve to guide investigation; and as the localities are often isolated, the position in the series may be determined by a little attention to these remarks, and a comparison of the characters of species and genera.

Comparatively few species have been determined from authentic Potsdam sandstone in its more eastern localities, although numerous forms have been described from calcareous and shaly beds, regarded by some geologists as equivalent, by others as newer, and by still others as older than the Potsdam sandstone. I have made no comparisons with these, since they appear to me all entirely distinct from those which I have enumerated and described from the sandstone of the Mississippi valley, and approached in character only by the later forms of that period.

In this connexion, moreover, our attention is directed to the fact that this sandstone of the Mississippi valley, in its eastern extension, has greatly thinned towards the outlet of Lake Superior; and from observations on the Escanaba and Menomonee rivers, I am satisfied that its thickness is greatly reduced, there being but a narrow space between the Lower Silurian limestones and the crystalline rocks. These crystalline rocks of the south shore of Lake Superior had assumed essentially their present condition before the deposition of the Potsdam sandstone; the ocean on the west of this barrier was, in a measure, separated from that on the east; and the distribution of the fauna has probably been influenced by the same causes.

Notwithstanding the successive stages recognized, the physical conditions have been very monotonous throughout the entire period; and in the character of the fauna, there are similar indications. We find great numbers of individuals of one species; and although recognizing very distinctly numerous species, there is a kind of uniformity of character and monotony of expression, never equalled by so many species in any formation of equal thickness; or even of much less thickness, where consisting of varied character and conditions of deposit.

The multitude of individuals of a few species is really wonderful; for in some beds the layers may be separated at every inch, or even half-inch, and yet the entire surface is covered with the dismembered parts of these ancient trilobites.

In the preparation of this paper, I have received much valuable assistance from Mr. R. P. WHITFIELD, whose discrimination in distinguishing the fragmentary species, and mechanical skill in disentangling these fragile materials from a friable sandstone, as well as accurately representing them in the illustrations, have enabled me to describe and characterize species which otherwise would, at the present time, have been left untouched.

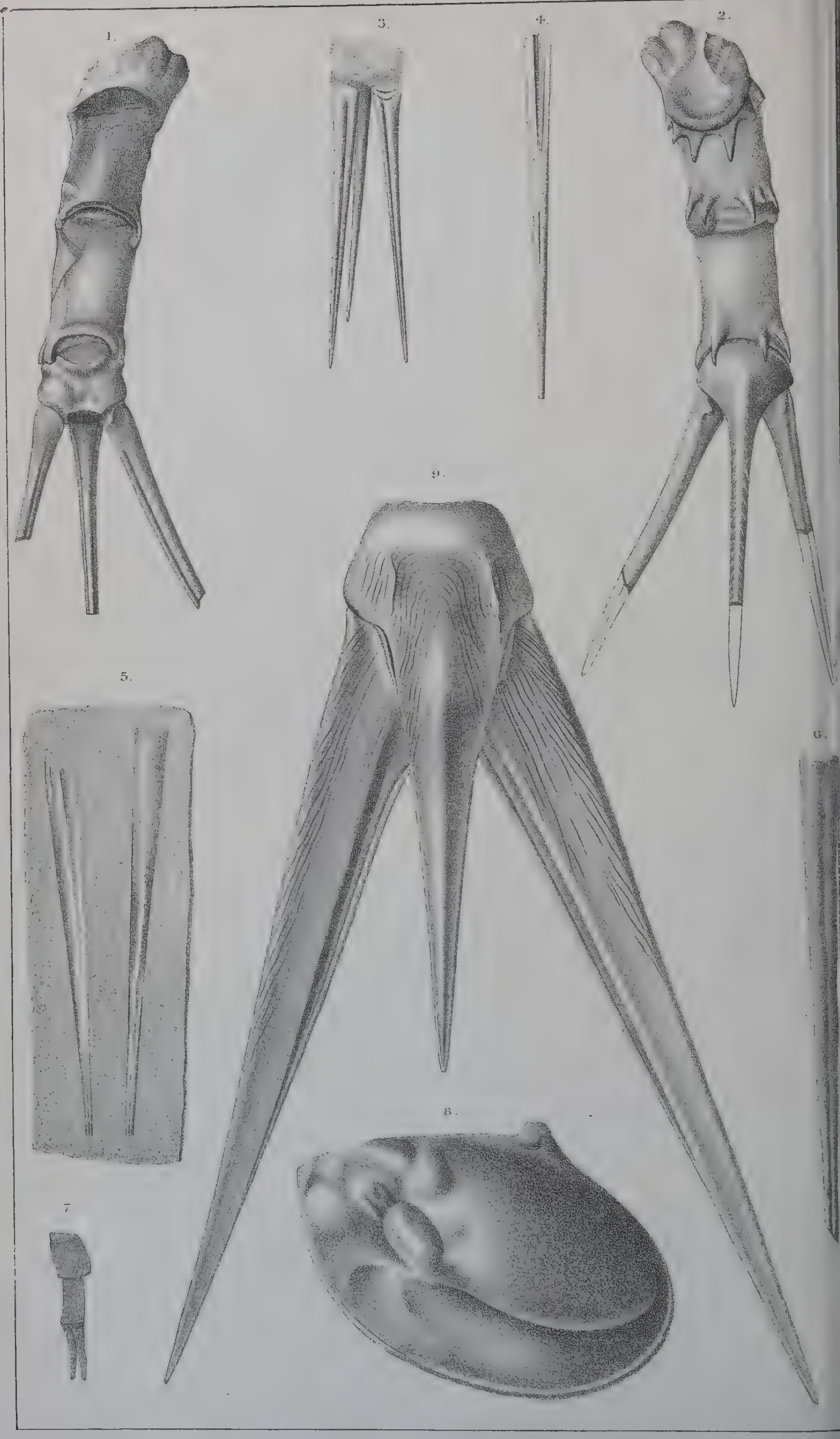
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PLATE I.

CERATIOCARIS ARMATUS.

FIG. 1. Ventral side of a specimen, showing three segments, besides the terminal one, with the tail-spines.

" 2. Dorsal side of the same, showing the spines at the posterior margins of the annulations.

" 3. Ventral side of the terminal joint, and tail-spines, of another individual.

CERATIOCARIS LONGICAUDUS.

FIG. 7. A fragment showing the posterior joints of the abdomen, and tail-spines. This figure is erroneously referred to in the text as fig. 4.

" 4, 5 & 6. Detached spines found in the same bed with fig. 7.

CERATIOCARIS? PUNCTATUS.

FIG. 8 The carapace of this peculiar crustacean.

DITHYROCARIS NEPTUNI.

FIG. 9. The terminal joint and tail-spines of this species.

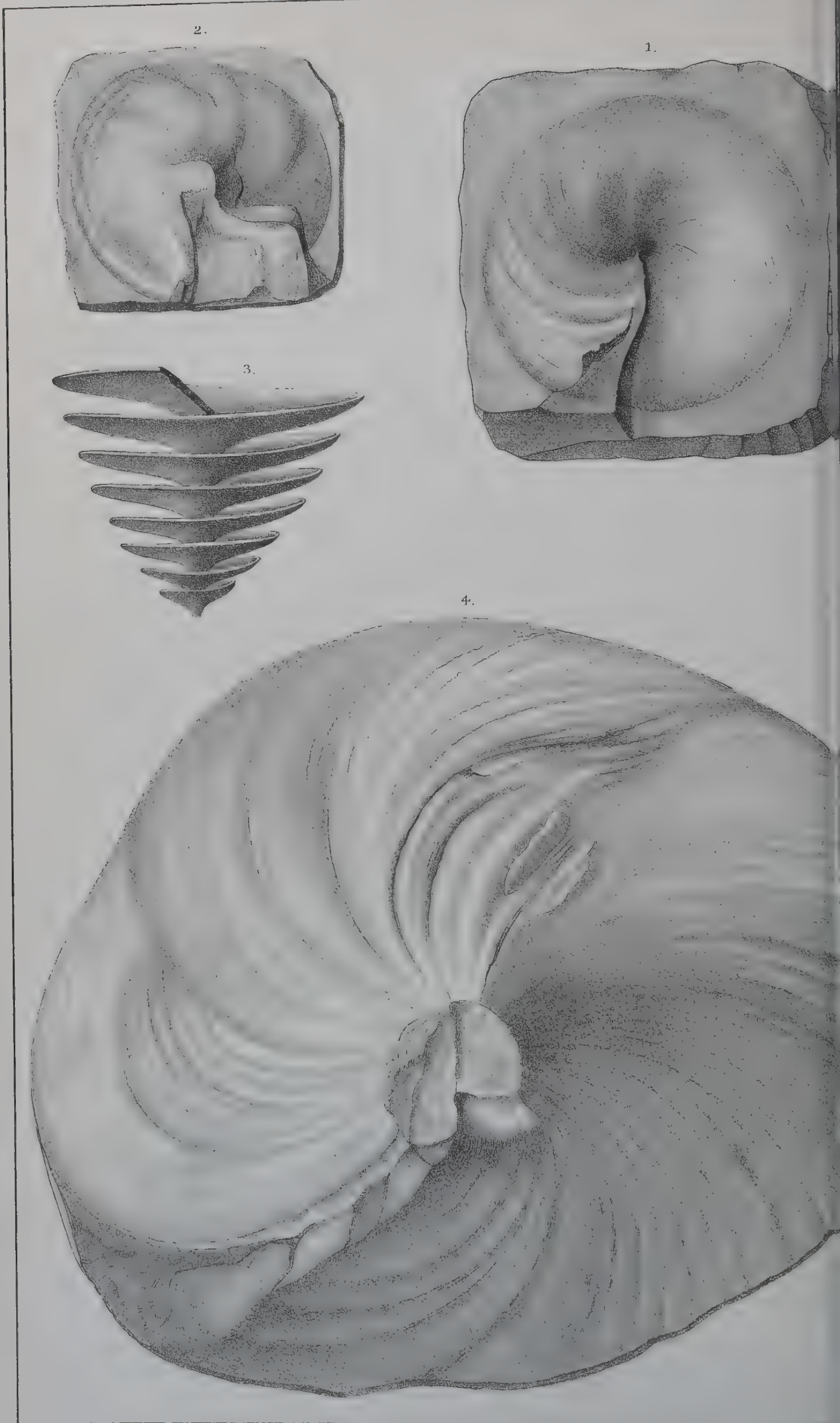
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PLATE II.

SPIROPHYTON TYPUM.

FIG. 1. Upper side of the frond, at about the sixth or seventh volution from the base.

" 2. A transverse section of the same individual, about two volutions lower than fig. 1; looking upon the lower side.

" 3. A restored figure, showing the mode of growth.

SPIROPHYTON CRASSUM.

FIG. 4. A view of the upper side of a volution of this species.

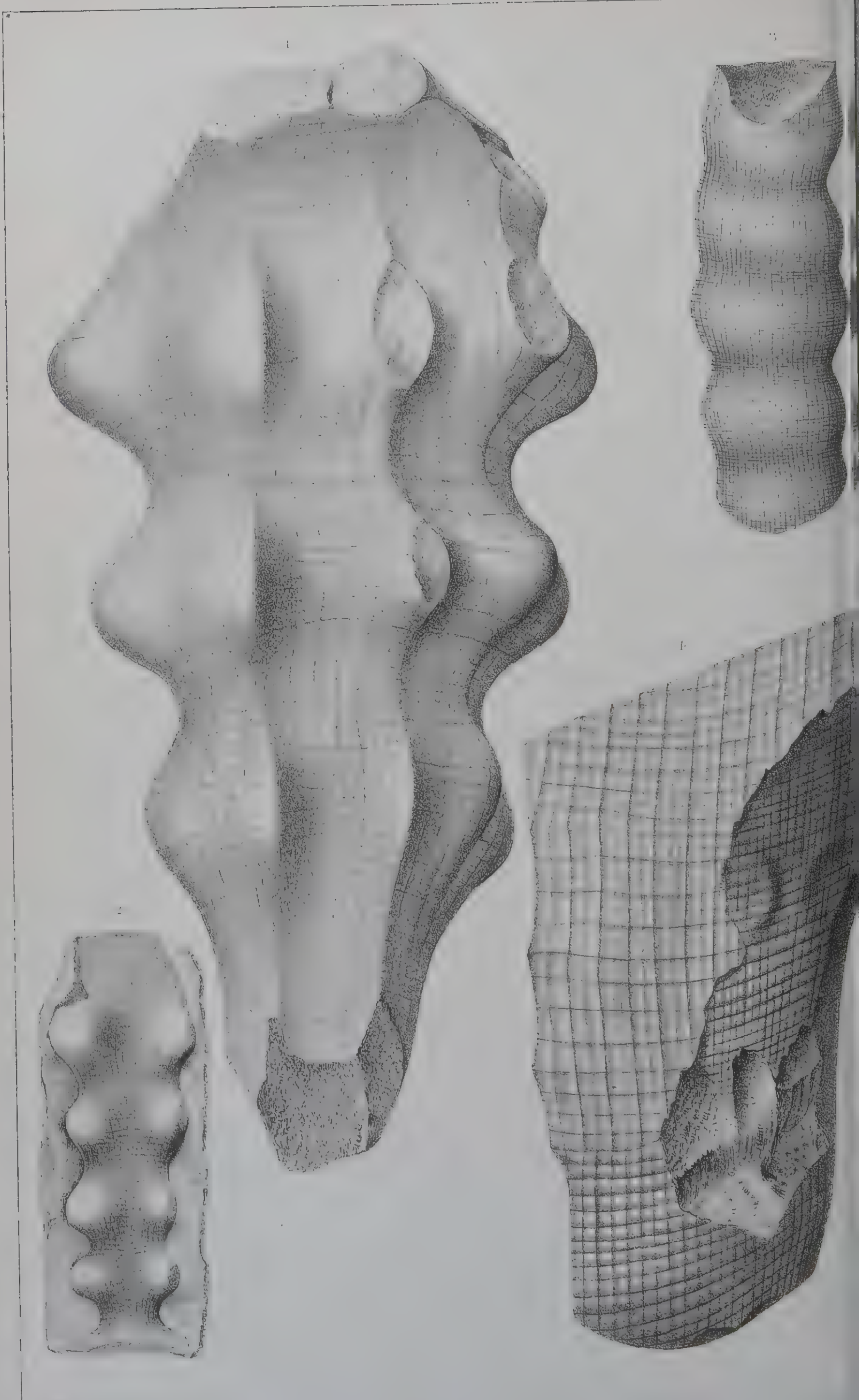

PLATE III.

Dictyophyton tuberosum.

Fig 1. A figure of a specimen of this species, natural size. This figure is from a cast of the original specimen described by Mr. Conrad.

Dictyophyton nodosum.

Fig. 2. A figure from a cast made in a natural mould in the shaly sandstone.

Dictyophyton annulatum.

Fig. 3. The figure is made partially from a cast of the stem in shaly sandstone : natural size.

Dictyophyton fenestratum.

Fig. 4. A portion of the stem near the base. The lighter portion of the figure shows the exterior markings; while the other parts show the impression made upon the matrix by the interior markings, or the cast of the interior of the stem.

This species is more robust than any of the New-York species, and the cancellating striæ are stronger. The form of the stem has apparently been nearly cylindrical, gently enlarging from the base, and a little undulating on the margin as if slightly annulated.

The relations of this species are clearly with the strong stems which I have referred, with hesitation, to *D. newberryi* (See Plate iv, f. 3).

The specimen is from the Chemung narrows, Chemung county, N.Y.

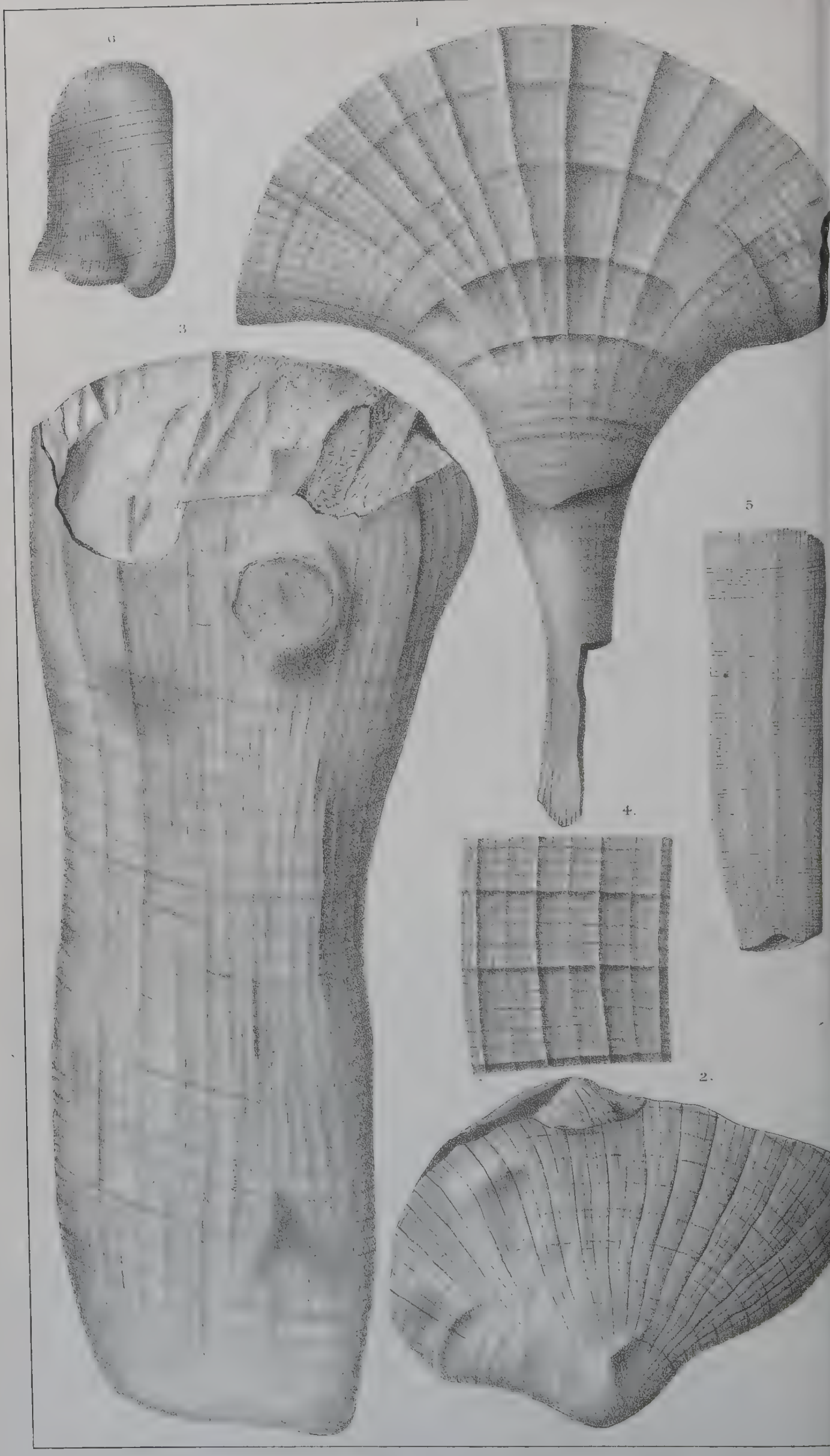
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PLATE IV.

Dictyophyton newberryi.

Fig. 1. A nearly entire frond of this species. The lower part is a little imperfect, that portion remaining showing an apparent fibrous structure resembling rootlets.

" 2. A cast of the interior of the expanded portion of the frond of this species. In the specimen fig. 1, the upper funnel-shaped portion of the frond shows a tendency to separate from the stem below, producing a form similar to this one.

" 3. The stem of a large individual of this species?

" 4. A portion of the surface from another stem, where the markings are well preserved.

Dictyophyton filitextile.

Fig. 5. A figure from a cast made in a natural mould in sandstone. In the figure, some of the transverse lines are comparatively too strong.

Dictyophyton redfieldi?

Fig. 6. A fragment of a stem which belongs, apparently, to this species.

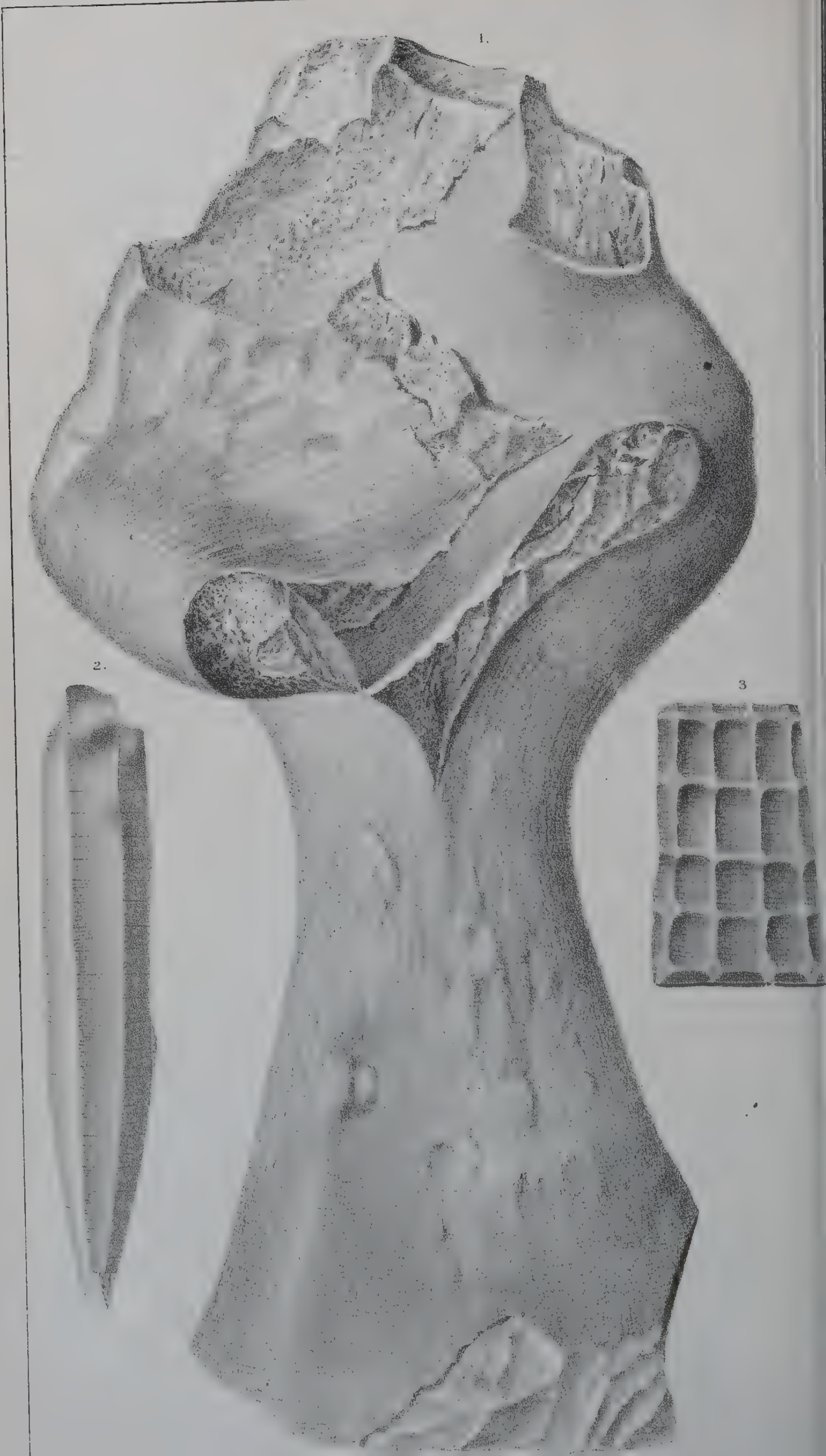
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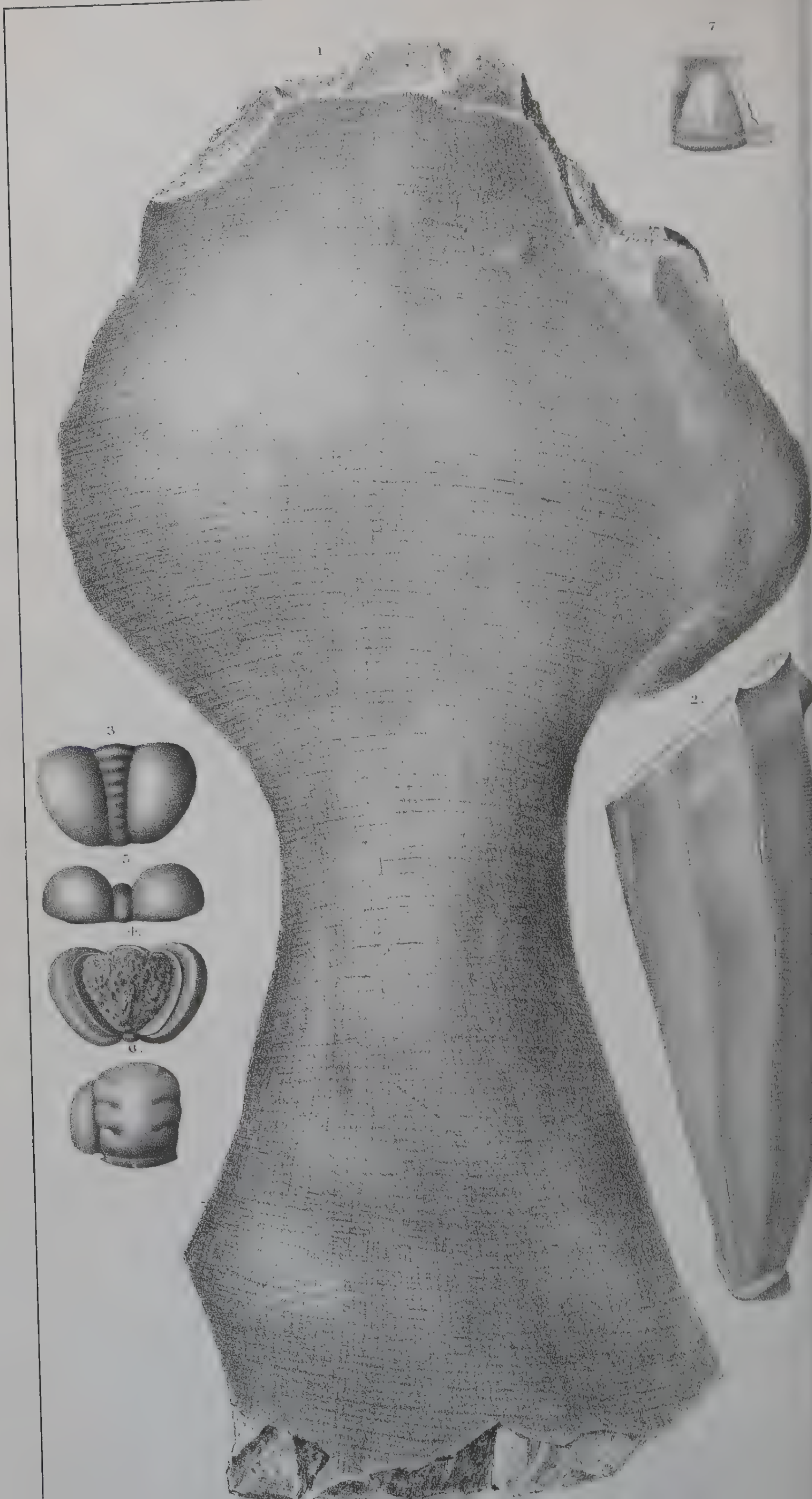
PLATE V.

DICTYOPHYTON REDFIELDI.

This figure represents that part which was the upper side of the specimen as imbedded in the stone. The upper spreading portion of the frond has been split open (probably from pressure), and the margins of this separation can be distinctly traced, while the upper and lateral portions of the frond are folded into the cavity.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PLATES V & V A.

EXPLANATIONS OF ADDITIONAL FIGURES.

PLATE V.

CHEMUNG GROUP.

DICTYOPHYTON CONRADI.

FIG. 2. The dorsal view, the narrower side on the exterior curve. The figure is two-thirds the natural size.

DICTYOPHYTON RUDE.

FIG. 3. A portion of the surface of a stem : natural size.

PLATE V A.

POTSDAM SANDSTONE.

DICTYOPHYTON CONRADI.

FIG. 2. Lateral view : two-thirds the natural size.

PEMPHIGASPIS BULLATA.

FIG. 3. The upper surface.
FIG. 4. The lower surface.
FIG. 5. Profile view from the posterior extremity.
The figures are six times enlarged.

AMPHION? MATUTINA.

FIG. 6. The glabella and part of one fixed cheek. The figure is four times enlarged.

CONOCEPHALITES OPTATUS.

FIG. 7. The glabella and part of fixed cheeks : six times enlarged.

PLATE V A.

DICTYOPHYTON REDFIELDI.

This figure represents the opposite side of the specimen shown on Plate v.


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PLATE VI.

Lingula mosia.

Figs. 1, 2, 3. Varieties of form referred to this species, from Mazomania.
Fig. 3 *a*. A broadly ovate form of this species? from Stillwater.

Lingula aurora.

Fig. 4. A specimen showing the two valves slightly displaced.
" 5. A larger individual, probably the ventral valve, which is truncated at the extremity.

Lingula aurora, *var.*

Fig. 6. The exterior of this form, which is more nearly elliptical than the preceding.
" 7. A cast of the interior of a ventral valve of this species.
" 8. An enlargement of the surface, showing the regular concentric lines of growth and the undulating lamellose striæ, which, crossing the lines of growth, give the apparently punctate texture.

Lingula winona.

Fig. 9. A figure of the specimen, natural size.

Lingula ampla.

Fig. 10. A figure of this species, of the natural size.

Discina? inutilis.

Fig. 11. A figure of the specimen, enlarged two diameters. The substance of the fossil has been partially removed, but the impression of the surface remains.

Lingulepis pinnaformis.

Fig. 12 & 13. Two forms of the shorter valve, which have been referred with doubt to this species.
" 15. An enlargement of the cast of this valve, showing a flabelliform muscular impression.
" 14. An elongate spatulate valve, which has the typical form of Dr. Owen's species.
" 16. An enlargement of the cast of a similar valve, showing the tripartite muscular impression.

Obolella? polita.

Fig. 17. A figure of a specimen, natural size.
" 18. An enlargement of a specimen of similar form.
" 19. A cast enlarged to the same degree as the preceding, and showing the cavities left by the articular bosses or muscular pads.
" 20. The interior of the ventral? valve, showing the muscular impressions, with a sinus at the apex. The figure is greatly enlarged.
" 21. The dorsal? valve, enlarged as the preceding, showing the muscular impressions with larger bosses or articulating surfaces of the cardinal line.

Fig. 22. A brachiopod having the form of Strophomena or Strophodonta, but its generic relations are not determined.

Orthis pepina.

Fig. 23. A dorsal valve, natural size.
" 24. A ventral valve, natural size.
" 25. A cast of the dorsal valve.
" 26 & 27. Casts of the interior of the ventral valve, fig. 26 showing the vascular impressions.

PLATYCERAS PRIMORDIALIS.

FIG. 28. A nearly entire individual. The specimen is of the medium size among those in the collection.

EUOMPHALUS? VATICINUS.

FIG. 29. The upper side of the spire. The specimen is somewhat distorted.

THECA PRIMORDIALIS.

FIGS. 30 & 31. Figures showing the opposite sides of the shell.

SERPULITES MURCHISONI.

FIG. 32. A figure of the natural size of the specimen.

PTYCHASPIS GRANULOSA.

FIG. 33. A figure of a small head, enlarged two diameters, to show the exterior markings.
" 34. A cast of a larger individual, natural size.
" 35. A profile of the same in outline.
" 36. The head of a very small individual, enlarged three diameters. The specimen shows a broader glabella in front, with distinct eye-lobes on the fixed cheeks.
" 37 & 38. Profile and lateral views of a cheek of this species.
" 39. A part of a thoracic segment.
" 40. A large pygidium, corresponding with the one referred to this species by Dr. OWEN.

Specimens of the head of this species, at least once and a half as large as fig. 34, have been seen in the same association.

PTYCHASPIS MINISCAENSIS.

FIG. 41. The glabella and fixed cheeks of an individual of medium size.
" 42. A profile of the same.
" 43. A much smaller head, given for comparison with *Ptychaspis granulosa*, f. 34.
FIG. 44. A profile of the same.
" 45. A cheek of this species, the figure of natural size.
" 46. A pygidium of the same species.
" 47. A segment of the body, found in the same association, but probably belonging to CHARIOCEPHALUS.

PTYCHASPIS, sp.?

The head of a very small individual of an undetermined species. It may possibly be the young of one of the above species.

CHARIOCEPHALUS WHITFIELDI.

FIG. 49. The glabella and fixed cheeks, showing a curving frontal limb, and without visible furrows in the glabella, which is a cast. The figure of natural size.
" 50. A specimen preserving the glabella and fixed cheeks, where the frontal limb is nearly straight. There are two pairs of furrows distinctly marked in the glabella. The figure is twice the natural size of the specimen.
" 51. A profile of the preceding specimen.
" 52. A movable cheek of this trilobite, natural size.
" 53. A smaller movable cheek of the same species.

AGNOSTUS JOSEPHA.

FIG. 54. The head of this species, showing the short spines at the postero-lateral angles.
" 55. The pygidium of the same species.

These figures are enlarged three diameters.

Conocephalites anatinus.

Fig. 34. A glabella.
" 35. A cheek, associated with the same. Three miles above Reed's landing, Lake Pepin.

Conocephalites diadematus.

Fig. 36. A glabella : from Marine mills.
" 37. A larger glabella : from Root river.
" 38. A cheek : from Root river. The outline in front *a*, shows the extension of the "*doublure*", or lower side of the frontal limb.

Conocephalites wisconsensis.

Fig. 39. A head, with spine restored, in outline : from Trempaleau.
" 40. A part of a larger head : from Trempaleau.
" 41. A cheek, from Trempaleau.
" 42. A spine, from Lake Pepin (probably a cephalic spine of this species).

Conocephalites hamulus.

Fig. 43. Glabella with spine : from Miniska.
" 44. A spine (of Lonchocephalus), belonging to this species??

Conocephalites patersoni.

Fig. 45. A small glabella.
" 46. A large glabella.

Conocephalites binodosus.

Fig. 47. A pygidium, with nodes, showing three segments besides the terminal one in the axis, and three divided ribs besides the anterior articulation : axis wide and strong.
" 48. A cheek of this species?, in the same rock at Osceola.

Dikelocephalus ?

Fig. 49. A pygidium with spines, the axis narrow; five articulations besides the terminal ones; the lateral lobes with four or five annulations, and the anterior ridge terminating in a border; the anterior margin curved and extended in a spine.

Arionellus bipunctatus.

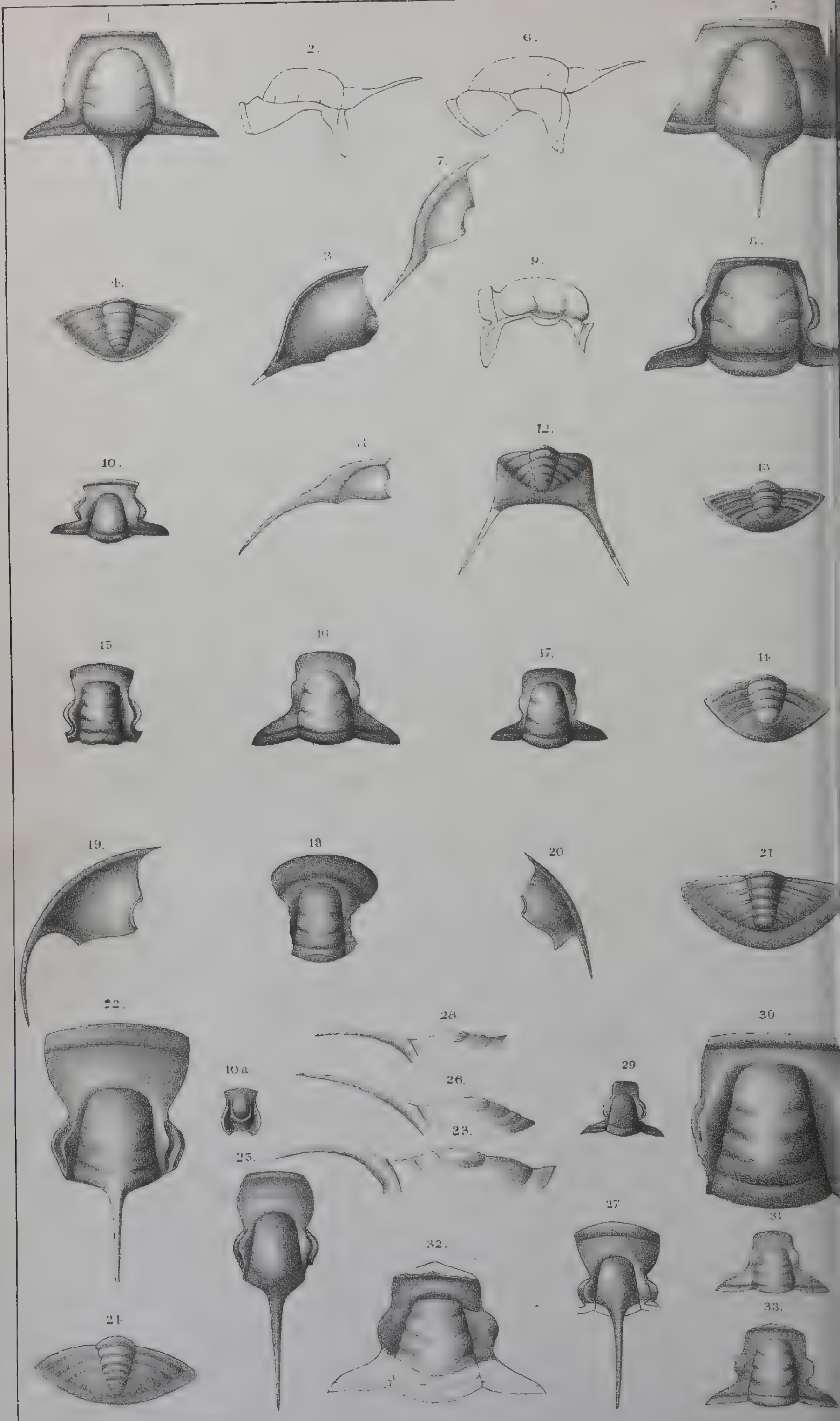
Fig. 50. Glabella and fixed cheeks, twice enlarged : from Root river.
" 51. A cheek, twice enlarged : from Lawrence creek.

Illænurus quadratus.

Fig. 52. A glabella.
" 53, 54. Cheeks of different individuals.
" 55. A thoracic segment.
" 56. A pygidium.
" 57. A larger glabella.

Conocephalites nactus (n. s.).

Fig. 58. A small species with ovate conical glabella which is marked by three distinct pairs of furrows. the posterior ones of which extend obliquely backward nearly to the occipital furrow. It is somewhat larger and less prominent than *C. minor*, with a narrow occipital ring without spine. It occurs in the lower beds of the sandstone near the mouth of Black river, Wisconsin.



R. P. Whitfield, del.

PLATE VIII.

Conocephalites minor.

[Figures four times enlarged.]

Fig. 1. The glabella and fixed cheek.
" 2. Profile of the same.
" 3. A movable cheek.
" 4. A pygidium of the same.

Conocephalites minutus.

[Figures four times enlarged.]

Fig. 5. Glabella and fixed cheeks.
" 6. Profile of the same.
" 7. Cheek of the same species.

Conocephalites eos.

Fig. 8. Glabella and fixed cheeks.
" 9. Profile of the same.

Conocephalites iowensis. (Figs. 10 – 12 & 30.)

Fig. 10. A small head. The glabella is represented too round in front. *See figure* 29, *Plate* vii.
" 10 *a*. Hypostoma of this species.
" 11. A cheek of the same species.
" 12. A pygidium of the same.

Ptychaspis granulosus? (Fig. 13.)

Fig. 13. A pygidium, which is of frequent occurrence in slabs containing the head of this species.
" 14. The pygidium of an undetermined Trilobite.

Dikelocephalus misa. (Fig. 15.)

Fig. 15. The glabella and fixed cheeks of this species. The glabellar furrows are not properly copied in this figure. *See figure* 4 *of Plate* 10.

Conocephalites eryon. (Figs. 16 & 31.)

Fig 16. A glabella and fixed cheeks of this species. The glabella is represented too round in front. *See fig.* 10, *Plate* vii.
" 31. A similar specimen from Lacrosse. The anterior pair of furrows are rarely seen.

Conocephalites oweni. (Figs. 17 & 20.)

Fig. 17. A glabella and fixed cheeks.
" 20. A movable cheek from the same specimen in which the head is found.

Conocephalites diadematus. (Figs. 18 & 21.)

Fig. 18. The glabella and frontal limb of this species? showing a very narrow space between the former and the elevated portion of the latter.
" 21. A pygidium, associated in the same specimens of stone with the glabella: from Marine mills.

Conocephalites shumardi. (Figs. 19 & 32.)

Fig. 19. A movable cheek, referred with some hesitation to this species: from Marine mills.

" 32. Part of the glabella and fixed cheeks, restored in outline from other specimens. This is the largest individual seen.

Conocephalites wisconsensis. (22 – 24, 27, 28.)

Fig. 22. Glabella, frontal limb, and part of fixed cheeks; the glabella showing indistinct furrows.

" 23. Profile of the same.

" 24. A pygidium associated with the preceding specimens.

[" 27. A smaller individual, not showing glabellar furrows.

" 28. A profile of the same.

Conocephalites hamulus.

Fig. 25. The glabella, frontal limb, and part of fixed cheeks; with a slender spine from the occipital ring.

" 26. A profile of the same.

Conocephalites anatinus.

Fig. 29. The glabella and fixed cheeks of a small individual, from Trempaleau.

Conocephalites perseus.

Fig. 33. Glabella and fixed cheeks of a small specimen from Kickapoo. The figure is twice enlarged.

Some of the figures on this plate, having been incorrectly traced in lithographing, have been reproduced on Plate vii.

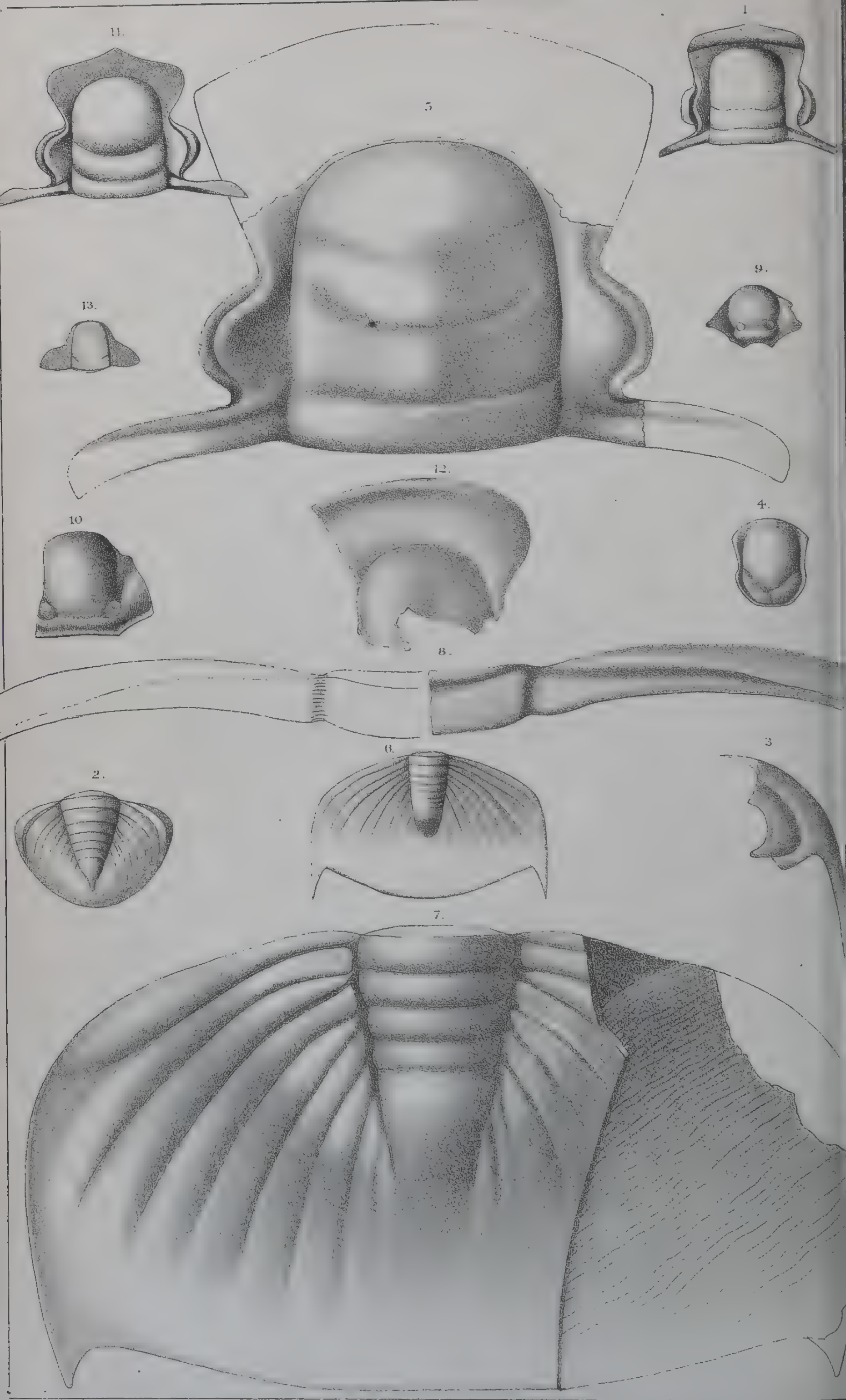

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PLATE IX.

Dikelocephalus pepinensis.

Fig. 1. Glabella and fixed cheeks. The anterior furrows are scarcely shown in the figures.
" 2. Pygidium of the same species.
" 3. A cheek.
" 4. Hypostoma of the same.

Dikelocephalus minnesotensis.

Fig. 5. Glabella and fixed cheeks. The frontal limb is represented in outline, from another specimen in which this part is preserved. From Mazomania.
" 6. A small pygidium from Lagrange mountain.
" 7. A large pygidium from the Magnesian limestone near Madison, Wisconsin.
" 8. A thoracic segment; one side restored in outline.
" 9. Part of a small hypostoma.
" 10. Part of a larger hypostoma.

Dikelocephalus minnesotensis, *var.*

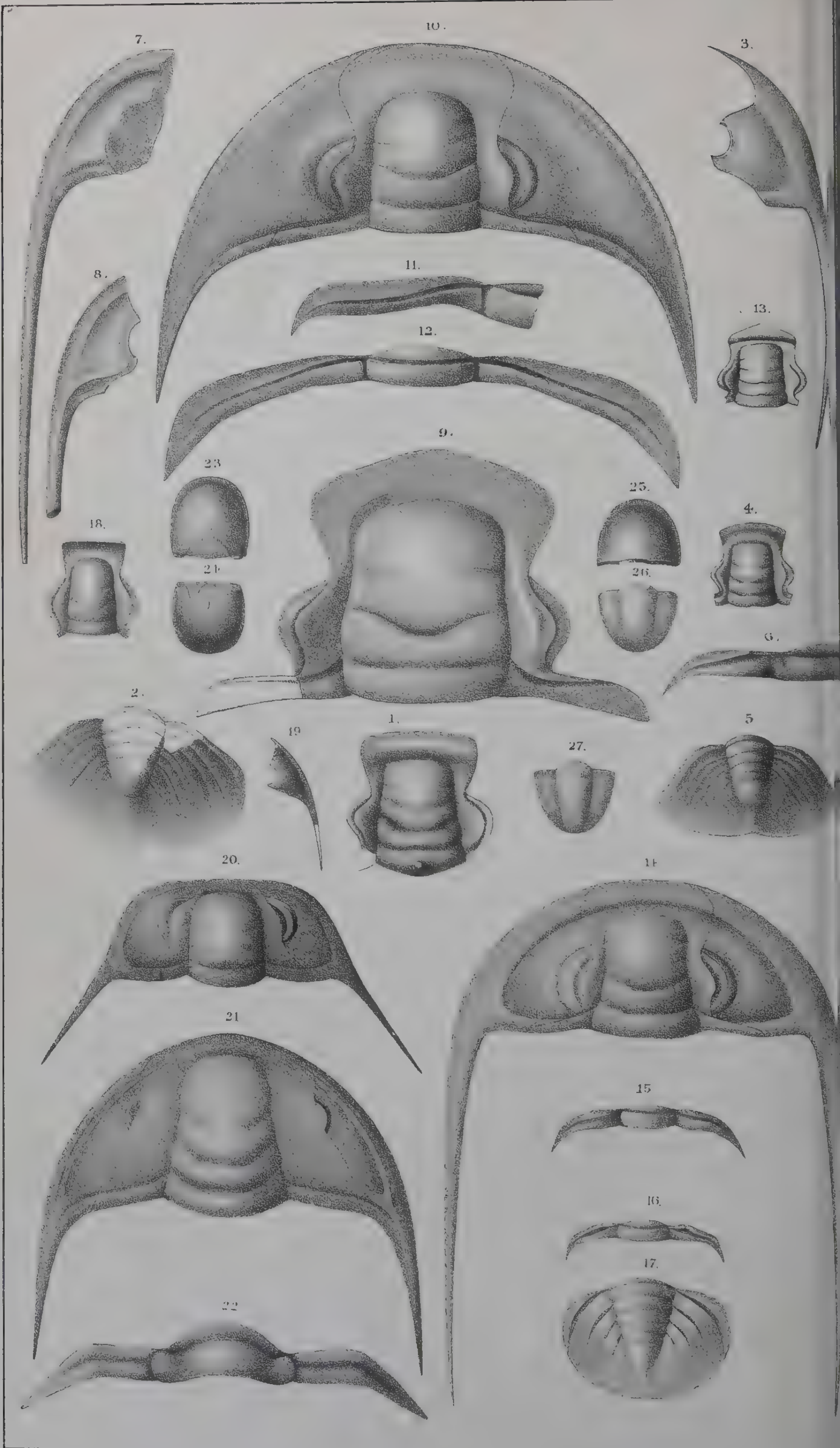
Fig. 11. Glabella, fixed cheeks, and frontal limb.

Dikelocephalus minnesotensis, *var.* limbatus.

Fig. 12. A part of the glabella and frontal limb of this variety.

Triarthrella auroralis.

Fig. 13. Glabella and fixed cheeks, twice enlarged From Lagrange mountain.



R. P. Whitfield, del.

Swinton, de

PLATE X.

DIKELOCEPHALUS SPINIGER.

FIG. 1. Glabella and part of the fixed cheeks, showing the base of a spine on the occipital ring.

" 2. An imperfect pygidium, associated in the same stone with the head.

DIKELOCEPHALUS, sp.?

" 3. The cheek of a species which has not been identified : from Lake Pepin.

DIKELOCEPHALUS MISA.

FIG. 4. The glabella and part of the fixed cheek.

" 5. A pygidium occurring in the same association; and the same is found on the specimens with fig. 4.

" 6. A part of a thoracic segment of this species? from the same block on which the glabella occurs.

" ?7 & 8. Imperfect movable cheeks, apparently belonging to *D. misa;* occurring in beds where no other species of the genus are known.

DIKELOCEPHALUS MINNESOTENSIS, *var.*

FIG. 9. The glabella and fixed cheeks, having the frontal limb slightly extended in the centre : Stillwater.

DIKELOCEPHALUS MINNESOTENSIS.

FIG. 10. A head, restored from actual specimens of the glabella and cheeks.

" 11. Part of a thoracic segment which has apparently been a little bent near the axis.

" 12. A thoracic segment, more than half of which, on the left side, is from an actual specimen : the other part is restored to correspond with it.

DIKELOCEPHALUS PEPINENSIS.

FIG. 13. The central portion of a small head.

" 14. A restored figure of a head from actual specimens.

" 15 & 16. Thoracic segments from different parts of the body, showing a little difference in the direction of the furrow. These segments occur in specimens associated with the heads, cheeks and pygidia of this species.

" 17. A pygidium of the same species.

DIKELOCEPHALUS OSCEOLA.

FIG. 18. The head, twice enlarged.

" 19. A cheek, natural size : found in the same stone.

CHARIOCEPHALUS WHITFIELDI.

FIG. 20. A head restored from actual specimens of the glabella and cheeks.

PTYCHASPIS MINISCAENSIS.

FIG. 21. A head restored from actual specimens of the separate glabella and movable cheeks. The cheeks appear narrower than when given separately; as they are shown in perspective, to correspond with the convexity of the head.

" 22. A thoracic segment : the righthand extremity is restored, to correspond with the actual portion on the left.

AGNOSTUS PARILIS.

FIG. 23. A head, three times enlarged.

" 24. A pygidium, enlarged in equal degree.

AGNOSTUS DISPARILIS.

FIG. 25. A head, four times enlarged.

" 26. The pygidium? of this species, four times enlarged.

" 27. A pygidium showing transverse furrows, equally enlarged.

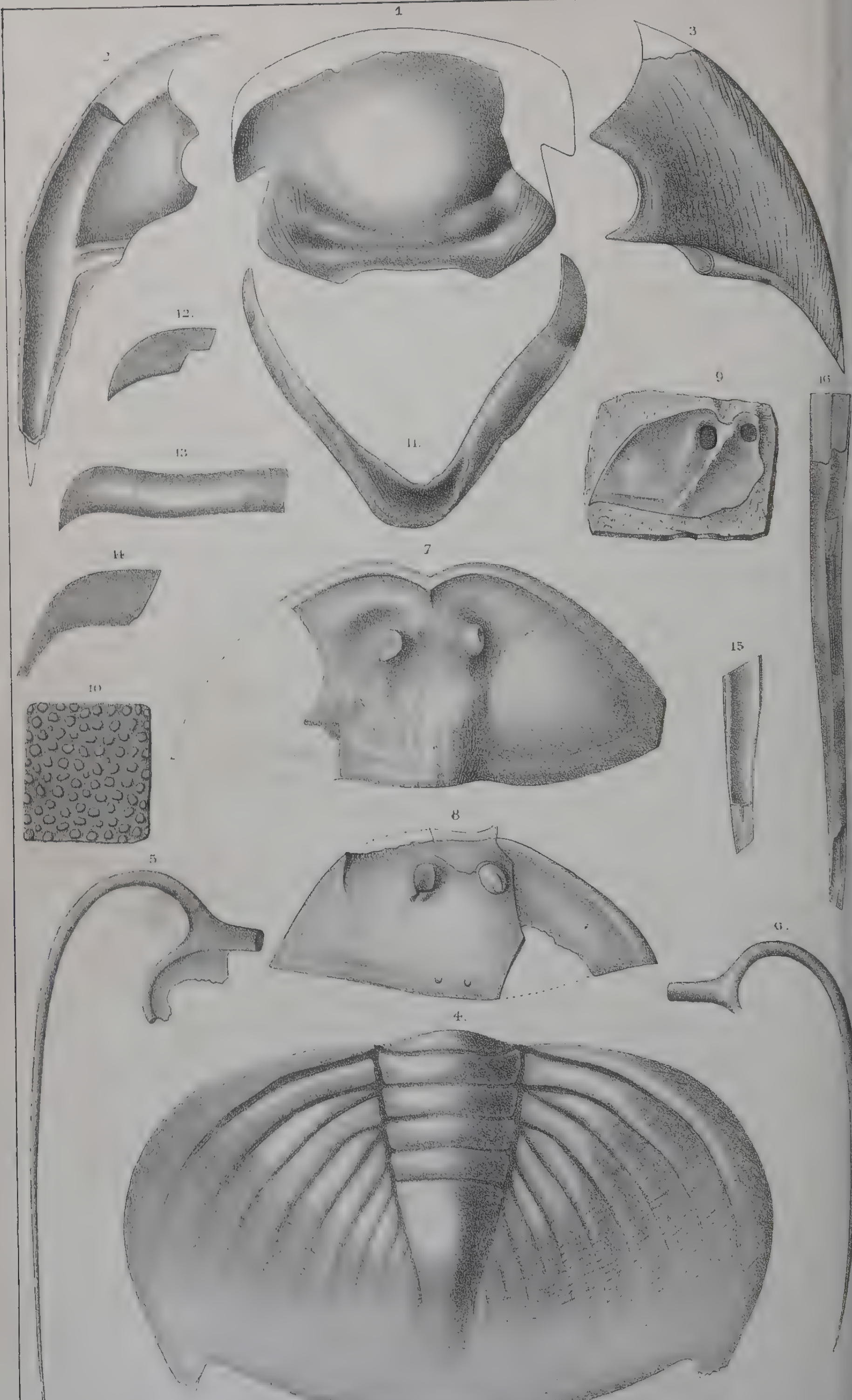


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PLATE XI.

Dikelocephalus minnesotensis.

Fig. 1. The hypostoma of this species.
" 3. A cheek of the same.
" 4. A pygidium of the same.

Fig. 2. A cheek of *D. pepinensis?*

Fig. 5 & 6. Spines of an undetermined trilobite, referred by Dr. D. D. Owen to *Lonchocephalus hamulus*.

Aglaspis barrandi.

Fig. 7. A large carapace of this species.
" 8. A smaller carapace.
" 9. The lower side of a part of a small carapace, showing the cavities of the eyes.
" 10. Enlargement of the surface.
" 11. A portion of the crust, which may have been of a segment at the posterior part of the body.
" 12, 13, 14. Fragments which appear to be the extremities of thoracic segments.
" 15, 16. Spines corresponding in character to the crust in other parts of the body; probably caudal spines.

The following list will illustrate the stratigraphical distribution of the fossils described in the preceding pages, from the Potsdam sandstone of the Mississippi valley.

Species *from the upper beds of the Sandstone, and base of the Calciferous sandstone, extending not more than one hundred feet below the latter rock.*

Fossils.	Page.	Plate and figure.	
Lingula aurora	126	VI,	4 & 5.
L. aurora, *var.*	127	VI,	6–8.
L. mosia	126	VI,	1–3 & 3 *a*.
Discina? inutilis	130	VI,	11.
Euomphalus? vaticinus	136	VI,	29.
Serpulites murchisoni	136*	VI,	32.
Dikelocephalus minnesotensis,	138	IX,	5–10; X, 10–12, and XI, 1–3 & 4.
D. m. *var.* limbatus,	141	IX,	12.
D m. *var.*	141	IX,	11, and X, 9.
D. pepinensis	142	IX,	1–4, and X, 13–17.
Triarthrella auroralis	177	IX,	13.
Aglaspis barrandi	181	XI,	7–16.

Species *from the beds which are here grouped together as the central portion of the formation, and which may hereafter be subdivided.*

Dendrograptus hallianus	124		
Lingula winona	126	VI,	9.
Orthis pepina	134	VI,	23–27.
Platyceras primordialis	136	VI,	28.
Dikelocephalus misa	144	VIII,	15, and X, 4–6 & ? 7 & 8.
D. osceola	146	X,	18–19.
D. spiniger	143	X,	1–2.
Conocephalites anatinus	158	VII,	34–35, and VIII, 29.
C. binodosus	160	VII,	47–48.
C. diadematus	167	VII,	36–38, and VIII, 18 & 21.
C. eos	151	VII,	24–25, and VIII, 8–9.
C. eryon	157	VII,	10–16, and VIII, 16 & 31.
C. hamulus	166	VII.	43–44, and VIII, 25–26.
C. nasutus	155	VII,	3–9.
C. oweni	155	VIII,	17 & 20.
C. patersoni	159	VII,	45–46.
C. perseus	153	VII,	17–23, and VIII, 33.
C. shumardi	154	VII,	1–2, and VIII, 19 & 32.
C. wisconsensis	164	VII,	39–42, and VIII, 22–24 & 26–28.
Arionellus bipunctatus	169	VII,	50–51.
Ptychaspis granulosa	173	VI,	33–40.
P. miniscaensis	171	VI,	41–47, and X, 21–22.
P. ?	174	VI,	48.
Chariocephalus whitfieldi	175	VI,	49–53, and X, 20.
Illænurus quadratus	176	VII,	52–57.
Agnostus disparilis	179	X,	25–27.
A. josepha	178	VI,	54–55.
A. parilis	179	X,	23–24.

Species *from the lower beds.*

Lingula ampla	125	VI,	10.
Lingulepis pinnaformis	129	VI,	12–16.
Obolella? polita	133	VI,	17–21.
Theca primordialis	135*	VI,	30 & 31.
Conocephalites minor	149	VIII,	1–4.
C. winona	161	VII,	26–28.
C. iowensis	162	VII,	29–33, and VIII, 10–12 & 30.
C. nactus	200	VII,	58.

SUPPLEMENTARY NOTE ON THE POTSDAM SANDSTONE.

When I commenced this paper, I had intended to confine myself strictly to the description of fossils in my collection from the sandstone of the Upper Mississippi valley, and a comparison with those previously described from that region of country.

I have not desired to depart from this course; and I have already said that it formed no part of my plan to compare these western forms with those of more eastern localities, which have been obtained in the older rocks of Canada and Vermont, and brought out in the publications of the Canadian Survey. I cannot, of course, have failed to perceive a similarity of form between some of the Western Trilobites, and those from the Quebec group; though I believe there is not specific identity in any of them. Should such identity be proved hereafter, the latter would of course have prior authority in the nomenclature. There has been no opportunity for a comparison of the fossils of these two regions; and those of both being in a fragmentary condition, it may ultimately turn out that the discovery of more perfect individuals may establish relations which are not at present apparent. I am authorised to say, however, that Sir William E. Logan is still disposed to regard some of the trilobites of the Quebec group as occurring in masses which may have been derived from a somewhat older formation, and imbedded in these strata at the time of their deposition.*

In making a comparison between fossils of the Quebec group, as developed in Newfoundland, on the one hand, and in several localities in Eastern Canada on the other, it is remarked that while there is a general resemblance between the faunas of the two extremes, "the Newfoundland rocks have none of the Trilobites, such as Conocephalites, Dikelocephalus, Menocephalus, and others which give to a small portion of the Point-Levis series a primordial aspect."†

The western species are all from a sandstone of well authenticated position and relations with the superincumbent rocks, but of moderate thickness as compared with the Potsdam and Quebec groups of Canada, Vermont and Newfoundland; and we do not yet know the character and fossils of the lowest beds of the

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* Geology of Canada, 1863, p. 860.

† Geology of Canada, p. 263.

formation. It seems to me, therefore, that the comparisons can be more satisfactorily made after we shall have become more fully acquainted with the Quebec and Potsdam species and their stratigraphical relations. If there are any points yet in doubt among these disturbed strata, which can be solved by palæontological facts, these few species from the West may perhaps offer some aid in the solution.

I learn from Sir William E. Logan that an important part of these ancient strata in Newfoundland, of the age of the Quebec group, are comparatively undisturbed and highly fossiliferous. Whenever the fossils from these undisturbed strata shall have been studied, together with those from the nearly horizontal sandstones of the Mississippi valley, there will be afforded adequate means of making a comparison with the fauna of the disturbed portions of the intermediate country; and thus doubtless some questions, at present undetermined, will find a solution.

In comparing the older rocks of New-York and of the East generally, with those of the West, it should not be forgotten that there is a long interval on the line of the northern outcrop of these ancient strata, between the St.Lawrence and the western limit of Michigan on the Menomonee river, where we can expect little aid from palæontology. The fossiliferous beds of these ancient formations in Wisconsin lie to the west of what appears to have been a great promontory at the time of their deposition, stretching southward from the region of Lake Superior far into the ancient sea. The disconnexion caused by this promontory between the East and the West, would of itself prepare us to expect a fauna, differing, in a great degree, from beds of corresponding age on the opposite sides.

It has been shown, by the investigations of the Canadian Survey, that not only the Potsdam sandstone, but all the fossiliferous beds below the Birdseye and Black-river limestones are absent from Kingston on Lake Ontario to Lacloche on Lake Huron. From Lacloche to Lake Superior, there is a sandstone coming in below the Birdseye limestone, which, from its position, may be considered as of the age of the Chazy formation*, and equivalent to

* The "Chazy formation" of the Canadian Geological Survey, in its eastern localities, includes a sandstone which comes in below the greater part of the limestone, leaving from ten to twenty feet of shale and limestone beneath (*Geology of Canada*, 1863, p. 123). It is apparently this sandstone of the Chazy formation, having in Canada a thickness of fifty feet, which has become augmented in its western extension, while the calcareous part of the formation has partially or entirely disappeared.

the St.Peters sandstone of Wisconsin and Minnesota; and it is this sandstone, doubtless, which has been taken for the Potsdam sandstone in some localities along that line.

The succeeding Birdseye and Black-river formation, from Lacloche to Lake Superior, has become a buff-colored magnesian limestone, or weathering externally to this color, but still holding the characteristic fossils.

In New-York, a sandstone (the Potsdam) lies immediately beneath a magnesian limestone (the "Calciferous sandrock") : this deposit is succeeded by a calcareous formation (the Chazy), including a sandstone, and surmounted by the Birdseye, Black-river and Trenton limestones.

In Wisconsin, Iowa and Minnesota, we have undoubted Trenton limestone, and below it a buff-colored magnesian limestone containing so many of the characteristic fossils of the Birdseye and Black-river limestones as to leave no doubt of the parallelism of these beds with those of New-York. Below this magnesian limestone we have the St.Peters sandstone, corresponding, as already shown, with the Chazy formation; and beneath this a magnesian limestone, which, in its position and lithological character, corresponds in all respects with the "*Calciferous sandrock*" of New-York.

It is from all these facts, that the lower sandstone of the Upper Mississippi valley has been placed in parallelism with the sandstone of New-York known as the "Potsdam."

Notwithstanding however that this sequence is precisely like that observed in New-York, it may not yet be regarded as proved that the sandstone, from which I have described these fossils, is in all respects the equivalent of the Potsdam sandstone of New-York, Vermont and Canada. It may represent more, or it may represent less, than that formation. The *lower* accessible beds of the Mississippi valley may represent the Potsdam of one hundred and fifty or two hundred feet in thickness in the typical localities in New-York, while the middle and upper beds of the West may be of epochs not represented in that part of the series studied in New-York; and in some other places, as in the regions just mentioned, the same epochs may be represented by a shaly or semi-calcareous deposition, or may be included in the commencement of the Calciferous epoch. It should not therefore be regarded as decided that the Potsdam sandstone, as developed in New-York, occupies the entire interval from the base of the oldest sedimentary formation of the palæozoic era, to the Calciferous sandstone.

From what we know of the primordial fauna in other localities, we are prepared to find beds above or below, or both above and below, the epoch represented (so far as now known) by the Potsdam sandstone of New-York, and which may still be of the same period. (*See Note at the foot of page* 220.)

The evidence from the undisturbed region of the Mississippi valley shows that the period of the Potsdam sandstone, or a very considerable part of it, may be represented by a small proportion of arenaceous matter. The section of the rocks of Missouri, given by Prof. SWALLOW, shows four separate magnesian limestones* and three distinct sandstones, below beds which he recognizes as the Birdseye and Black-river limestones. Taking the upper of these magnesian limestones to represent the base of the Birdseye and Black-river limestones†, and the upper "Saccharoidal sandstone" to represent the Chazy or St. Peters sandstone of the Upper Mississippi valley, we would then have in the Second Magnesian limestone a representative of the Calciferous sandstone, or Lower Magnesian limestone of Wisconsin and Iowa, with a thickness of two hundred and thirty feet‡. Below this, therefore, if the depositions were uniform, we should find the sandstone as seen on the Upper Mississippi; but instead of a continuous arenaceous formation, we have as follows:

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* The section given by Professor SWALLOW is as follows:

BLACK-RIVER AND BIRDSEYE LIMESTONE.

Calciferous Sandrock.	FIRST MAGNESIAN LIMESTONE	190 feet.	Magnesian Limestone Series.
	SACCHAROIDAL SANDSTONE	125 "	
	SECOND MAGNESIAN LIMESTONE	230 "	
	SECOND SANDSTONE	70 "	
	THIRD MAGNESIAN LIMESTONE	350 "	
	THIRD SANDSTONE	50 "	
	FOURTH MAGNESIAN LIMESTONE	300 "	

† Dr. SHUMARD has remarked (Geological Report of Missouri, Part ii, p. 160), that the fossils of this higher Magnesian limestone "are most like those of the Black-river and Trenton groups." There can be no doubt but here, as well as elsewhere in the West, this fossiliferous magnesian limestone is of the age of the Birdseye and Black-river limestones.

‡ Dr. SHUMARD, however, considers the Third Magnesian limestone as the equivalent of the "Calciferous sandstone" of New-York and of the "Lower Magnesian limestone" of Iowa and Wisconsin. This opinion is founded on identical or similar forms of fossils; and admitting this evidence, it will necessarily modify the conclusions which have heretofore been drawn from the interpreted sequence.

SECOND SANDSTONE..................	70 feet*.
THIRD MAGNESIAN LIMESTONE	350 "
THIRD SANDSTONE..................	50 "
FOURTH MAGNESIAN LIMESTONE ...	300 "

We look in vain, therefore, for that great development of arenaceous sediments at this period, which we find farther to the north in the Mississippi valley†.

Considering this great augmentation of magnesian limestone towards the south, and the largely increased thickness of the sandstone farther north, we might be prepared to expect the final disappearance of the limestone in that direction, and of the sandstone to the southward. Now it happens that to the north of the localities on the Upper Mississippi valley, we have, upon Lake Superior, a great development of sandstone, the precise age of which has for some time been debated, and from which no fossils have been obtained, with the exception of a single species of LINGULA‡.

In his Report for 1840, Dr. HOUGHTON says:

"This Lake Superior sandstone, in its easterly prolongation, rests against "and upon the primary range of the Ste.Marie's river, before described; "while on the south, it is seen to pass beneath the limestone at the Nebeesh "rapids of the boat and canoe channels of that river. The rapids or falls "of the Ste.Marie's river are formed by the passage of the waters over "the outcropping edge of the sandrock, which inclines or dips from this "point southerly; thus passing conformably below the limestone before "alluded to."

So long since as 1845, I had myself observed that the sandstones of the St.Mary's river come out from beneath the Black-river and Birdseye limestones; but the Calciferous sandstone was nowhere visible in the immediate neighborhood. The later and more complete investigations of the Canada Geological Survey have proved the absence of the Calciferous sandstone, and of the

* Dr. SHUMARD has given this sandstone as attaining a thickness of one hundred and twenty to one hundred and forty feet in some localities (*Geological Report of Missouri*, p. 166).

† If we take the First Magnesian limestone of Prof. SWALLOW as the representative or equivalent of the Eastern Calciferous sandstone, it will not materially alter the general conclusion; for we add but 125 feet of sandstone, with 190 feet of magnesian limestone, above the beds just cited.

‡ This LINGULA I have formerly referred to *L. prima* of the Potsdam sandstone; but a later critical examination of the specimens which have been more carefully separated from the surrounding stone, shows it to be more nearly related to a species in the Calciferous sandstone.

Potsdam sandstone, on the north shore of Lake Huron; and alo that this sandstone of St.Mary's river (which is now regarded as identical with that of the south shore of Lake Superior) rises from beneath the Black-river and Birdseye limestone, and there is no evidence of the Calciferous sandstone in that region. It is the opinion of Sir WILLIAM LOGAN that this sandstone represents the Upper sandstone, or fills the place of the Chazy formation in the East, the limestone being absent; and that it is this arenaceous deposit, greatly augmented, which gives the Sandstone formation of the south shore of Lake Superior*.

In 1846, Mr. C. C. DOUGLASS discovered a fossiliferous magnesian limestone resting upon sandstone on the south side of Keweena point, in a line between the head of the Bay and the mouth of Misery river. In 1848 or 1849, Messrs. J. W. FOSTER and J. D. WHITNEY brought from this locality several species of fossils, which were submitted to the examination of the writer. The geologists of Michigan represent that the same sandstone, at Grand island, is succeeded by a fossiliferous limestone, which is doubtless the same as that of Keweena point.

The character of the fossils from the locality on Keweena point is such as to leave no doubt that the limestone is equivalent to the Buff limestone of Wisconsin; holding the identical fossils, and representing the Birdseye and Black-river limestones. The order of sequence in Central and Western Wisconsin, and in Iowa and Minnesota, is that already given, viz :

BUFF LIMESTONE = BIRDSEYE & BLACK-RIVER;
ST.PETERS SANDSTONE;
LOWER MAGNESIAN LIMESTONE.

Now the beds of Buff limestone at Keweena point rest upon a sandstone which has a much greater thickness than the St.Peters sandstone is known to have in any of its western localities; nor has the Lower Magnesian limestone been seen below that sandstone, so far as we now know; unless the magnesian limestone seen by Mr. MURRAY, of the Canadian Survey, at the mouth of Dead river, beneath the sandstone of the south shore of Lake Superior, be the true Lower Magnesian limestone or "Calciferous sandrock"†.

* Geology of Canada, 1863, pp. 83 – 86.

† On this [the south] coast at the mouth of the Dead river, north of Marquette, there is a mass of very ferruginous dolomite, of which the stratification is not very distinct; but it is overlaid by the sandstone, which fills up the inequalities in the

In assigning a position to the sandstone of the south shore of Lake Superior, to the south and east of Keweena point, from the evidence before us, and in the absence of any fossils which may aid the decision, we are forced to conclude that this formation is a greatly augmented development of the St.Peters sandstone; or, that the Lower Magnesian limestone ("Calciferous sandrock") has thinned out, so as to leave the St.Peters sandstone and the Potsdam below (as developed in the Mississippi valley) to go on as one mass to the northward.

This latter inference would be sustained, in some measure, by the facts observed in Missouri, where we have nearly nine hundred feet of the three Lower Magnesian limestones, which, in Southern, Central, and Southwestern Wisconsin, are represented by rarely more than two hundred or two hundred and fifty feet of similar rock. At anything like this ratio of thinning, the Lower Magnesian limestone would have disappeared long before reaching the parallel of the south shore of Lake Superior, or it might continue to occur in isolated lenticular masses.

It is scarcely possible to suppose that the lower sandstone of the Upper Mississippi valley has not, at some time or in some form, extended as far as Lake Superior; but it is far from being proved that the sandstone now so largely developed on the south shore is that sandstone, as we have shown. If this sandstone consist of both that above and that below the Calciferous, or of the St.Peters and the Potsdam proper, then at some point we should expect to find a change of character, or nonconformity between the beds, to indicate the lapse of time in the deposition of the Lower Magnesian limestone of more southern localities; and this view is sustained by the observed want of conformity between the sandstone and Magnesian limestone near Dead river just cited.

Admitting the deposition of the lower sandstone of the Mississippi valley to have been continued in its higher stage into the region of Lake Superior, it seems remarkable that the rock now

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surface of the dolomite. and dips at a moderate angle to the southwest. The dolomite is cut by what appears to be a vertical dyke, which, instead of intersecting the sandstone, abuts againt the bottom of it (See Geology of Canada, 1863, pp. 83 & 84).

In the Mississippi valley, the Upper sandstone is apparently conformable to the Magnesian limestone on which it reposes; but its lower beds sometimes consist of a fine argillaceous sediment, indicating a lapse of time before the arenaceous deposit began; while in other places, the superincumbent sand has penetrated into fissures in the rock below, and I have never observed any beds of passage between the two formations.

exposed along its shores should be so destitute of fossils; while we find equal difficulty in accounting for the sudden augmentation and difference of character of the St. Peters sandstone of Wisconsin, if we conclude the Lake Superior formations to be the same or equivalent beds. This difficulty, however, is not greater than we have in identifying the lower sandstone of the Mississippi valley with the thin formation in Missouri and elsewhere.

We have at Trempaleau and in the vicinity of Lake Pepin, together with what we find on the Black and Chippewa rivers, something like five (perhaps six) hundred feet of sandstone below the Lower Magnesian limestone; while in Missouri its only known representative in kind are the two beds of sandstone already noticed, alternating with massive formations of magnesian limestone, and together having a thickness of one hundred aud twenty feet. The actual thickness of the sandstone in the northern localities cited is not known, but it is presumed to be much more than that which is exposed above the river-level : the entire thickness is probably not less than eight hundred feet, and perhaps much more. This mass, therefore, is apparently represented by one hundred and twenty feet of sandstone in Missouri; and this is divided into two bands, which may represent two of the epochs noticed in the northern localities, as indicated by the fossils of the Upper Mississippi valley.

Regarding, for the present, the formations below the St.Peters or Saccharoidal sandstone in Missouri as equivalent in age with those of Wisconsin, we are compelled to recognize the Third and Fourth Magnesian limestones of the Missouri Reports (as well as the Second and Third sandstones) as represented in the sequence by the sandstone of the Upper Mississippi river*.

The material of this older sandstone has doubtless been derived from the crystalline quartzose rocks of the Huronian period, and which are still exposed in extensive masses on the southern side of Lake Superior, rising from beneath that formation.

Taking this view of its origin, we are, in the region of the Upper Mississippi, not far from its source; and the older conglomerates at the base of the sandstone in the central part of Wisconsin, which are similar to some of those on the south shore

* The fossils described from the Third Magnesian limestone by Dr. SHUMARD, do not, I believe, include any Trilobites; but all the species bear more analogy with those known in the Calciferous sandstone of New-York and of Canada, and Dr. SHUMARD regards this rock as of the age of the lower magnesian limestone of Iowa, Wisconsin and Minnesota.

of Lake Superior, may have marked the coast-line from which the materials of the formation were derived, while the finer sand was precipitated in the deeper ocean along the abruptly shelving coast to the southward.

In this sheltered position, accumulating to great thickness, while the gradual depression of the ocean-bed was going on, it has preserved, in all its stages, the phenomena of beach-lines, ripple and wave-lines, and even mud-cracks, with fucoidal remains in its lowest beds; affording at the same time favorable habitations for myriads of crustacean forms, and certain Mollusca which mark its successive stages. At the period when these shallow water or beach-lines are indicated in the sandstone of Lake Pepin and Trempaleau, the conditions farther to the south may have favored the accumulation of a magnesian limestone*.

The force of the oceanic current was apparently not sufficient to transport to great distances the arenaceous sediment; and to this cause is probably due its attenuation in Missouri, and its almost entire absence farther to the south.

The depression of the coast-line, whether a constant or a periodic movement, would be attended by a more or less marked change in the character of the sediments. At the time of the accumulation of the St.Peters or Chazy sandstone, not only was the Potsdam sandstone of the Upper Mississippi valley far beneath the sea-level, but, inferring from the undisturbed condition of adjacent portions of the country, the *source* of the materials of the older sandstone, the Huronian coast-line, had likewise become depressed beneath the level of the ocean. Consequently the source of this higher sandstone, still in part the coast-line of the Huronian rocks was removed farther to the north, and probably may have included to some extent the Laurentian formation.

Admitting this view of the case, we should expect to find the older conglomerates of Lake Superior overlaid unconformably by the sandstone of the newer period; while the conglomerates of the latter would be found still farther to the north, marking the outline of the ancient coast. We are met, however, with serious objections to this view; for the conglomerates of the north and east shores of Lake Superior are uptilted and cut by numerous trap dykes, while the sandstone of the south shore is nearly ho-

* There are at intervals in this sandstone, from near its base, thin bands which have an apparent magnesian character; so that even in the well-marked arenaceous portions of the formation, dolomitic depositions have occurred.

rizontal, and not penetrated by trap dykes, which sometimes cut the rock immediately beneath. The present aspect of the formations indicates a greater easterly extension of the upper sandstone than of the lower formation; while in a westerly direction, we know little of the higher sandstone beyond the eastern portions of Minnesota*.

Whether we may have, in the Lake Superior region, evidences of more than two periods in the accumulation of the conglomerates shales and sandstones, indicated by want of conformity one with the other, I am not prepared to assert from my own observations. I have already cited the opinion of Dr. HOUGHTON regarding the sandstone in its eastern extension towards the outlet of the lake, together with corroborative evidence from other sources, that this sandstone is of the age of the Chazy formation. In a later Report (1841), Dr. HOUGHTON recognizes a quadruple division of the sedimentary formations in the following order: 1st, "Conglomerate rock;" 2d, "Mixed conglomerate and sandrock;" 3d, "Red sandstone and shales;" and 4th, "Upper or Gray sandrock." Of the third division, he remarks, p. 40: "The red sandrock is less frequently traversed by dykes of trap than either of the rocks "before described, though dykes were several times noticed tra-"versing the whole of the several formations up to and including "the Red sandstone." Of the fourth division, he says (p. 52): "The composition of this rock differs from that of the lower "sandrock, in being more exclusively quartzy, while in epoch of "deposition, the rock under consideration should not be con-"founded with that of the Red sandstone. it has already been "stated that the Red sandstone of the south coast dips regularly "northerly, while the upper or Gray sandstone dips equally re-"gularly south or southeasterly; in which respect the last men-"tioned rock conforms to the limestone resting upon it, while it "rests itself upon the uptilted edge of the red sandrock below."

We have therefore an unequivocal assertion of the unconformability of the upper sandstone with the rocks below†.

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* We know, however, from the explorations of Dr. HAYDEN, of the occurrence of the older sandstone towards the base of the Rocky mountains (judging from the fossils), and we suppose that this may be connected with that of the Mississippi valley, and may have had a similar source. It is known that rocks of Huronian age extend westerly and northwesterly from the south side of Lake Superior, and these at one time may have furnished the materials for the deposits. Still, this would not make an objection, but rather sustain the argument I have advanced, so far as I have knowledge of the occurrence of this rock.

† It would appear, however, that at a subsequent period. Dr. HOUGHTON was induced to regard the conglomerates and red sandstones and shales which are penetrated by trap rocks, to be of the New Red sandstone.

Dr. OWEN, at a later period, in making investigations from the Mississippi valley to Lake Superior, has very clearly shown the probability, if not the ascertained certainty, that the Red sandstone of the western part of Lake Superior is inferior to the fossiliferous sandstones of the Upper Mississippi and St. Croix valleys; and he suggests that the latter may lie unconformably upon the disturbed and uptilted formation below.

From the disturbed and highly inclined position of the interstratified conglomerates and sandstones on the northern and eastern shores of Lake Superior, Sir WILLIAM LOGAN has become convinced that these deposits are older formations, and unconformable to the sandstone of the south shore from Keweena point to the eastward.

The testimony, therefore, of all those who have investigated the localities, concurs in recognizing two or more eras in the deposition of the conglomerates and sandstones of the Lake Superior region. And while the older beds of that area are apparently below the fossiliferous beds of the Upper Mississippi valley, the newer sandstone of the St. Mary's river, which is apparently of the age of the St. Peters sandstone, or the Chazy formation, will be found overlying the fossiliferous sandstone, either with or without the intervention of the Lower Magnesian limestone.

I have appended these few facts and arguments, with a view of presenting, in connexion with this notice, some of the points of interest yet remaining undetermined in regard to the older deposits of the West, and the difficulties in the way of determining their satisfactory parallelism with those of the East, considering simply the sequence of formations as originally presented in the State of New-York.

(*NOTE REFERRED TO ON PAGE* 213.)

This formation, in Canada, has a thickness of between six and seven hundred feet (*Geology of Canada*, pp. 88 & 89); but even there it is not supposed to represent the entire primordial zone. Nor does the fauna, at present known, bear so exclusively a primordial character as to lead us to suppose that we have reached the lowest beds. The typical forms of PARADOXIDES of Braintree, Massachusetts, and of Newfoundland, indicate, on palæontological grounds alone, a lower horizon than any we have reached in New-York, Canada, or in the Mississippi valley.

I have already noticed, in the preceding pages, the relations of some of these Trilobites with PARADOXIDES in certain parts of their structure. The condensation of generic characters observed in true PARADOXIDES (as well as in typical CONOCEPHALITES and OLENUS) seem to me diffused among the generic forms of the sandstone of the Mississippi valley; on which account alone, I would infer that this fauna is of a later epoch than the oldest primordial fauna. I have made similar observations regarding those forms, sometimes termed PARADOXIDES, in the older slates of Vermont.

SUPPLEMENTARY NOTE

ON SOME FOSSILS OF THE LOWER BEDS OF THE POTSDAM SANDSTONE OF THE UPPER MISSISSIPPI VALLEY.

SINCE the completion of the printing and engraving of the plates relating to the fossils of the sandstone of the Upper Mississippi valley, a re-examination of some of the specimens from the lower beds near Trempaleau, by Mr. WHITFIELD, has brought to light several forms, quite new and distinct from any before noticed*. One of them, a Crustacean somewhat resembling the pygidium of a Trilobite, has a very narrow axis and large swollen lateral lobes. It differs from the pygidium of a trilobite, in the extension of the narrow axis quite to the margin of the shield. On the straight side, the articulating face (if such it be) differs essentially from the corresponding parts of a trilobite. In these respects, also, it differs from AGNOSTUS.

From its remarkable characters, it seems necessary to designate it as an undescribed generic form; and I propose the name PEMPHIGASPIS.

GENUS PEMPHIGASPIS (n. g.).

Generic characters. The general form of the part of the shield known is semielliptical, rounded behind, nearly straight in the middle in front, and becoming rounded towards the outer margin; distinctly trilobate. Axis narrow, straight, and slightly narrowing posteriorly; distinctly annulated : annulations direct. Lateral lobes ovate, extremely gibbous or ventricose, rising much above the axis : margins at the sides abruptly incurved.

PEMPHIGASPIS BULLATA (n. s.).

PLATE V A. FIGS. 3, 4 & 5.

Three individuals of this species have been examined : the largest is about one-fifth of an inch in width, and a little less in length: The axis is marked by seven annulations, besides the posterior one : the lateral lobes are smooth, ovate, and very ventricose. The anterior extremity of the middle lobe, with a small area on the inner anterior face of the lateral lobes, may have been articulating faces. The lateral margins are abruptly incurved, flat below, with a narrow elevated ridge just without the inner edge.

The specimens are casts of the interior, and the character of the exterior surface is unknown. The figures are six times enlarged.

FIG. 3. The upper surface. FIG. 4. The lower surface.
FIG. 5. A profile view from the posterior extremity.

GENUS AMPHION?

A single glabella, much resembling in its lateral lobes the glabella of a CALYMENE, has been found in a specimen from the lower beds near Trempaleau.

Although not entirely corresponding with AMPHION, I refer it, for the present, to that genus.

* Several of these are illustrated on Plate v A. figs. 3 – 7.

AMPHION? MATUTINA (n.s.).

PLATE V A. FIG. 6.

GLABELLA gibbous, longer than wide, subovate, rounded and a little wider in front. Occipital ring narrow and straight; occipital furrow narrow. Posterior lobe a little oblique, the furrow deeply impressed and a little expanded at its inner extremity: median lobe with the sides nearly parallel, separated from the anterior lobe by a narrow distinct furrow; anterior lobe broad, the length somewhat less than half the entire length of the glabella, a scarcely defined depression extending obliquely from near the middle of its length to the front.

A part of one of the fixed cheeks remaining is semielliptical, a little wider behind than in front.

The specimen is too imperfect to admit of tracing the facial suture.

CONOCEPHALITES? (ARIONELLUS?) DORSALIS (n.s.).

Several small specimens have been observed, preserving the glabella and fixed cheeks.

GLABELLA moderately gibbous, minute, truncate-conical, a little wider at base than the length from the occipital furrow, with two distinct slightly oblique furrows, the posterior ones most oblique, and reaching about one-third across the glabella: occipital furrow narrow and well defined; occipital ring wider, more prominent in the middle, and produced into a node (which in the crust has probably been a short spine). Dorsal furrow well defined, and continuing of the same width and strength in front. Fixed cheeks a little wider at base, prominent, and continuing in a convex border in front.

The specimens have the form and aspect of *Arionellus bipunctatus*; but the glabella is more distinctly lobed, and the puncta at the anterior angles do not exist in this one.

CONOCEPHALITES OPTATUS (n.s.).

PLATE V A. FIG. 7 [Figure six times enlarged].

Specimens retaining the glabella and fixed cheeks have been observed.

GLABELLA narrow conical, and rounded anteriorly. The posterior lobe is small, oblique, and nearly separated from the glabella: the middle lobe is oblique, and longer than the posterior one; anterior lobe less distinct. Occipital furrow narrow and well defined: occipital ring rounded, prominent, and a little more elevated than the summit of the glabella.

The glabella slopes to a broad depression in the frontal limb, which is terminated by an abruptly elevated border. The posterior limb of the fixed cheek is much extended laterally; and the facial suture approaches the glabella near the front, where the fixed cheek preserves a little elevated ridge like a palpebral lobe.

This species is interesting in preserving the peculiar characteristics of the Genus CONOCEPHALITES, and also approaching the *C. sulzeri* of Europe.

NOTES AND CORRECTIONS.

GENUS RETZIA.

Since the pages relating to this genus were printed, Prof. Agassiz has kindly placed in my hands a series of European species which have been referred to the same designation. An inspection of these specimens shows still more clearly the heterogeneous characters of the material arranged under the generic term Retzia. It is impossible for me, at this time, to give the necessary attention for a proper elucidation of the question involved; but, should it not be undertaken by some one else, I will endeavor to continue the subject in the next Report on the State Cabinet.

LICHAS GRANDIS.

SUB-GENUS? TERATASPIS.

Thirteenth Report on the State Cabinet.

In the Fifteenth Report (first published in 1861), I have noticed a remarkable trilobite, under the name of *Lichas grandis.* The fragment then in my possession preserved only the posterior portion of the head. The lateral, or, as they appear to be, the posterior lobes of the glabella, are remarkable for their form and prominence, and are studded with strongly elevated nodiform or obtuse spines and shorter node-like tubercles.

A specimen kindly loaned to me by Rev. Mr. Barris preserves the anterior lobe, and very imperfectly the posterior lobes, which, as in the other specimens, are partially divided by a shallow groove. More recently, Prof. Ward of Rochester has placed in my hands a collection of specimens exhibiting a part of the head, preserving the anterior and posterior lobes of the glabella, together with a pygidium, and one or two other specimens. At the same time, I have obtained from Col. Jewett a portion of a pygidium which apparently belongs to this species.

These fragments, taken together, present points of difference from the ordinary forms of Lichas, which may render a separation from that genus necessary. The anterior lobe is round and ex-

tremely prominent; its base constricted by a broad groove, which is more distinct in front, and by which it is strongly separated from the anterior limb.

In three specimens, we have no evidence of lateral lobes in the position of these parts in ordinary LICHAS, though a considerable space is preserved on either side of the anterior lobe; so that if any such features existed, they were widely separated from that portion of the head.

The other lobes, whether middle or posterior, are entirely behind and on each side of the anterior lobe, and separated by a comparatively broad central space, which extends in a line from the base of the anterior lobe to the occipital furrow, a distance nearly equal to the longitudinal diameter of the anterior lobe. Each of the posterior lobes consists essentially of three distinct elevations: the inner one is the more rounded and prominent, and is surmounted by two rounded subclavate nodes. Of the lateral portion, the anterior division is subangular, and the posterior division less prominent. These features, however, either from accident or other causes, are subject to variation. From the elevated posterior lobes, the surface descends almost vertically to the occipital furrow, which is comparatively shallow. The occipital ring is somewhat broad and little convex: for two-thirds of its width on the anterior side, it is studded with tubercles; and the posterior margin supports a row of strong rounded subclavate nodes.

From two pygidia found in the same association, we obtain the following characters:

THE axis is broad and prominent, but its divisions are not shown. The lateral lobes are about as wide as the axis, marked by three prominent ribs and a less prominent fourth one, or division of the axis; all terminating in a narrow thickened border, from which proceed, on each side, four long and strong spines, which are themselves spiniferous on their sides, flattened and slightly grooved on the lower surfaces, and tuberculiferous on the upper side.

The primary tail-spines are sometimes (perhaps always) bent backwards, and the secondary spines are often slightly curved. In one example, one of the posterior spines is more than two inches long, and imperfect, having apparently been at least three inches in length. In another fragment, one of the lateral spines still preserves two inches of its length, and, judging from the size where broken, has been at least two inches longer.

The cheeks and thoracic articulations are unknown.

One imperfect head measures nearly five inches across the base, with a length of three and a half inches, being incomplete in both directions. A portion of another head is quite as large in the parts preserved. Another smaller and imperfect specimen has a width at base of nearly three inches, with a length of more than two and a half inches to the occipital furrow. The anterior lobe of the glabella in this one is an inch and three-eighths in its longitudinal and transverse diameters, and its elevation above the frontal limb (which is broken away) has probably been greater than the diameter. The upper side of this lobe is worn off, but it still has a height above the surrounding groove of three-fourths of an inch.

The length of the body of one of the pygidia, to the division of the two posterior spines, is two and a half inches, and the width on the anterior margin is three inches.

This extravagant trilobite presents, to some extent, the characters of LICHAS; but in the pygidia with four lobes, and four spines on each side, there is a departure from the typical forms of the genus. The distinctly rounded and widely separated anterior lobe of the glabella, without adjacent lateral lobes, offers also some points of distinction from LICHAS.

These characters, however, are in some degree approached by *Lichas pustulosus* of the Lower Helderberg group (Pal. N.York, Vol. iii, pa. 368, pl. 78), the pygidium of which presents four divisions upon the margin.

In the elongate primary and secondary tail-spines, the Schoharie grit species resembles some forms of ACIDASPIS; as well also in the extreme ornamentation of the head, though not in the disposition of its parts.

The most extravagant European form of the genus, the *Lichas* (*Arges*) *armata* of GOLDFUSS, still preserves the distinctive generic features of the head, though the characters of the pygidium are less distinctive.

In the examples under consideration, there are so many peculiarities, that it may be found necessary to adopt a distinct generic name; in which case, I would propose TERATASPIS: Τερας, *Prodigium*; and ασπις, *scutum*.

LICHAS ARMATUS.

Thirteenth Report on the State Cabinet, p. 409.

This name is preoccupied: Change the name to LICHAS ERIOPIS.

LICHAS BOLTONI.

Palæontology of New-York, Vol. ii. pl. 70, f. 1.

This individual was originally regarded as the young of *Lichas boltoni*. An examination of the pygidia of three individuals has shown the persistence of the same characters; and on careful comparison of the minor characters, there seems sufficient reason for regarding this as a distinct species, for which I propose the name

LICHAS NEREUS (n. s.).

This species bears some relation to *Lichas scabra* of Europe, but is nevertheless quite distinct.

ERRATA.

Page 31, 5th line from top, for *species*, read *specimens*.
68, 27th line, for *Kœniger*, read *Kœnig*.
68, for *Receptaculites* ——? read *Receptaculites eatoni*.
70, 7th line, after *Niagara group*, add *of New-York*.
73, 7th & 8th lines from bottom, for corrected references to figures, see Explanations of Plates.
100, 16th line from bottom, for *M'Clakeney's*, read *M'Closkeney's*.
100, 9th line from bottom, for *House*, read *Howe*.
101, 15th line, for *comparative*, read *comparatively*.
104, 7th line from bottom, for *Alethopteris decurrens*, read *Alethopteris discrepans;* and make the same change of name in Table of Species, p. 105.
106, 6th line from bottom, after *preservation*, add *of vegetable fossils*.
108, under *Upper Devonian*, for *Portge*, read *Portage*.
109, 2d line of first note, after *page* 326, add *the specimens being of doubtful character*.
119, last line, add the letter *B*. before *F*.
122, 18th line, for *little*, read *much*.
123, at end of note, for 13137, read 147 – 168.
123, lines 17 & 18, for *Agnostis*, read *Agnostus*.
133, under *Obolella? polita*, transpose the second and third lines of references to Geological Report of Wisconsin.
140, 16th line, fill blank with *S. V. Shipman*.
175, 8th line, reference to Plate VI, for *figs*. 47 - 51, read 49 – 53.
179, 2d line, for *figs*. 24 *and* 25, read *figs*. 23 *and* 24.

(E.)

RADICAL WORDS

OF THE

MOHAWK LANGUAGE,

WITH THEIR DERIVATIVES.

BY REV. JAMES BRUYAS S. J.

MISSIONARY ON THE MOHAWK.

Published from the Original Manuscript.

PREFACE.

This volume contains undoubtedly the oldest grammatical or lexicographical treatise on the language of the Mohawks; and although but few of that tribe now reside in the State, the Mohawks occupy a most important place in our early history, and undoubtedly decided the sovereignty of New-York, and with it of most of North America. The History of the Five Nations, Hotinonsionni as they called themselves, has been imperfectly written by Colden, and will hereafter afford a subject for a noble work.

The Iroquois left no monuments on our soil : their language is their real monument. The Jesuit missionaries, who, from the days of the devoted Jogues to the close of the seventeenth century, when the cruel act of Bellomont prohibited any further attempts to christianise them, labored among the tribes, studied the various dialects with the care and ability of educated men. Chaumonot wrote a Huron grammar and works in Onondaga, Carheil in Cayuga, and Bruyas in Mohawk.

The present volume is one of the works of the last named, and was written evidently in the latter part of the seventeenth century, and most probably on the banks of the Mohawk. It is a closely written manuscript of 146 pages, which has been long preserved in the Mission House at Caughnawaga or Sault St.Louis near Montreal, adding to the interest of the room where Charlevoix and Lafitau wrote.

The grammatical sketch is rather a series of notes. The main work, the Racines Agnieres, or Mohawk Radical Words, comprises the primitive words of the language, arranged in five conjugations, with derivatives from each word, and examples in many cases of great importance as explaining the manners, habits and ideas of the people. Except in strict alphabetical arrangement, it is a very full Mohawk Dictionary, written in Latin, but with the meaning of the words in French.

The word taken as a root is a supposed infinitive; and in subsequent revisions of this work, the present indicative was adopted, but the present is the book as prepared by its author.

This clergyman, Father Jacques Bruyas, of the Society of Jesus, a native of Lyons, came to Canada in 1666, arriving at Quebec on the third of August. From the fourteenth of July 1767, when he set out for the Mohawk, down to his death at the Mohawk mission of Sault St.Louis, subsequent to 1700, he was constantly connected with the missions among the Five Nations; spoke the Mohawk as well as he did French; and was regarded as the Master of the language, in which he composed several works, besides the present and other treatises on it. His abilities were admitted by all, not only the writers of his order, but by Hennepin (who seems to have perused this very manuscript), Earl Bellomont and Cotton Mather. His knowledge of the various dialects of the Iroquois must have been great indeed; for after a short stay among the Mohawks in 1667, he was at Oneida from September 1667 to 1671; then among the Mohawks till 1679, except in 1673, when he was in the Seneca tribe. After this, he was chiefly at the Mission of Sault St.Louis on the St.Lawrence. He was Superior of the Iroquois missions for several years, and Superior of all the missions in Canada from 1693 to 1700. In the negotiations between the French and Iroquois from 1699 to 1701, he took an active part, and visited New-York with a letter announcing the termination of hostilities. His last appearance in New-York was in 1700 and 1701, at Onondaga.

PROEMIUM.

DE FORMATIONE VERBORUM.

Quatuor sunt tempora primitiva, ex quibus alia formantur, scil. : Infinitivus, præsens indicativi, futurum affirmationis et negativum.

A præsenti formatur imperfectum addendo aliquid in fine, ut Geθeθakȣe, *je pilais*, à geθeθa, *je pile.*

Præteritum quod habet eamdem finalem cum infinitivo, Plusquam perfectum, Futurum præterito mixtum, cognata sunt tempora quia ejusdem sunt paradigmatis.

Plusquam perfectum addit *nen* finali præteriti : ȣagatentionnen, *j'étois parti*, à præterito ȣagatention, *je suis party.*

Futurum affirmationis, Aoristus præsens Modi Potentialis et Imperativus sunt ejusdem terminationis, ut : egiθet, ȣageθet, seθet.

Futurum negationis duplex est aliud quod idem est cum præt. indic. : Iaten ȣagatention, *je ne partirai pas ;* aliud quod formatur a præsenti indicativi addita aliqua ex particulis motus localibus *nde*, *he*, *χe*, *se*, *θe*, *sere :* Iaten gatentionhe, *je ne partirai pas ;* Iaten geθeθanne o teram.

Potentialis modus vocatur ille qui respondet voci gallicæ *j'aurois :* Aongȣatentiong, *je serois parti.*

Imperativus formatur a 2da pers. singul. fut. affirm. sublato initiali E : seθet, *pile*, a eseθet, *tu pileras.*

Si post S sequitur I, præfigendum est T ante S ; v. g. Tsien . . netsi, ab Esien ; Tsiagenne, *sors*, ab esiagenne, *tu sortiras.*

Optativi tempora non differunt a potentiali modo nisi per postpositam voti expressivam *sen* vel *señȣen :* Aongȣatentiong señȣen, *utinam profectus essem.*

Subjunctivi tempora non sunt diversa a potentialis modi temporibus. Hactenus de initialibus verborum ; nunc agendum de finalibus ipsorum, et inflexionibus verborum.

DE TEMPORUM FINALIBUS ET INFLEXIONIBUS VERBORUM.

A.

Verba quorum infinitiv. desinit in A habent ut plurimum *præsens* terminatum in ȣ, *imp.* in akȣe, *fut.* in en, *neg.* in anne, quod est potius in usu ad significandum motum quam negationem subjunctivis, v. g. :

Kagannra, *voir*, P. Ch. *pr.* Tekkan-re, *imp.* Tekkansakȣe, nren, ranne; gahra, *mettre dessus*, gahre, hakȣe, hren, hranne.

Gentskȣahra, *mettre* v. g. *sur un siege*; Gaiatara, *peindre.* Iis omnibus additur *tie* ad significandam continuationem actionis vel actio æ. exercitur proficiscendo, v. g. Raθaratie, *il va parlant*, *il parle en marchant.*

Excipe Gaienna, *prendre*, quod habet *pr.* terminatum in as, *aff.* in χa, *neg.* nasere.

Gaiatara, neutr. *estre present ;* giatare, giatarakȣe, giatarag vel giatarann.

Onterita dicitur potius Ontentaon, *bruler la terre pour l'ensemencer ; pr.* tas, *f*, taȣe, *n.* tasere.

E.

Verba in E habent communiter *pr.* in e, *imp.* in ekȣe, *f.* in eg, *neg.* in sere, vel seg v. θe.

Gentagre, *estre gisant*, *couché*, *malade ; p.* gitagre, *I.* gitagrekȣe, *f.* ȣgitagreg, *n.* egitagrensere.

Onnhe, *vivre; p.* gonnha, *imp.* gonnhekȣe, *f.* egonnheg, *n.* egonnheseg.

Sic Ioθore, *il fait froid ;* Ioθarekȣe, eiȣθoreg.

Hogete, *il porte;* tekȣe, P. S.

Hoθonte, *il est attentif;* hoθontekȣe, P. S.

Hannagre, *il demeure;* grekȣe, greg, P. Ch.

Hæc verba sumunt alia tempora a verbis : Aθontaton, atketaton, ennagraton, aθoraton.

Ita Hajatate, *il y est present;* hajatatekȣe, tateg.

Onhȣentsiase, *il y a une teste;* tekȣe, teg.

Garonhiate, *il y a un ciel;* P. Ch. tet, ȣe, teg.

Iȣkste, *cela peze;* 2ae conj. P. S. tekȣe, teg.

Excipe 1° :

Gagȣanne, *estre grand;* P. Ch. *imp.* gȣannenne, *f.* gȣannha, *n.* nhasere.

Gahȣae, *frapper sur quelque chose; f.* eg.

Ohare, *laver; imp.* rehakȣe, renne.

Gaiote, *estre empeché:* S. agiote, *f.* eȣagioten, *n.* eȣagiotensere.

Teiosȣaθe, *lucet;* θekȣe, *f.* θenne vel θeg.

Excipe 2. Numeralia desinentia in age, quæ sic inflectuntur age, agennen, agehag. Tegni, te ȣenniserage, *il y a deux jours que* . . te ȣenniseragennen, *il y avait; f.* te ȣenniseragehag.

Excipe 3. Relativa in se, v. g. Gasȣense, *hayr* quelqu'un; *imp.* schakȣe, *f.* eȣakȣenseg.

I.

Verba in I significantia plenitudinem habent *pr.* in i, *imp.* innen, *f.* ig vel isere.

Gannonsi, *la cabane est pleine ;* gannonsinnen, gannonsig.

Sic omnia relativa in i habent *pr.* isk, *imp.* iskȣe, *f.* nien, *n.* nire.
Aχerihonniannisk, *j'enseigne;* nihakȣe, nien, nire.

Sic Atsori, *manger la sagamité ; pr.* gatsorisk, *imp.* rihakȣe, *f.* ri, *n.* rianne.

Onni et composita sic inflectes : nisk, nihakȣe, ni, nianne.

Sic ori et composita : Gannonhȣarori, *pr.* s, *dire sa chanson de mort ;* Atati, tisk, tali, tahianne v. tatiasere.

AON.

Verba in AON habent *pr.* in as, *imp.* askȣe, *f.* anne, *f. motus*, asere.

Gannhaon, *louer*, *commander;* nhas, nhaskȣe, nhanne, nhasere.
Gaȣejentataon, *sçavoir;* tas, tanne, tasere.
Gannontraon, *rencontrer*, *atteindre;* tras, traskȣe, tranne, trasere.
Gaientaon, tas, taskȣe, tanne, tasere, *tomber.*
Gannontaraon, *scandere montem;* taras, taranne, tarasere.

Excipe 1°. Gaiatajesion, *ne trouver pas une personne qu'on cherche;* P. Ch. sas, saskȣe, sa, sasere.
Gentaon, *dormir; pr.* tas, taskȣe, taȣe, taseg.

EñON,

habent *pr.* in ens, *imp.* enskȣe, *f.* enne, *n.* ensere.

Gaiageñon, *sortir;* P. Ch. ens, enskȣe, enne, ensere.
Gaiateñon, *tomber;* P. Ch. Gannagreñon, *avoir abondance*, quod in aoristo habet Ongnagren, P. S.
Garheñon, *le jour venir;* ens, enskȣe, enne, enrhensere.

Excipe Gasȣeñon, *haïr;* P. Ch. *pr.* gasȣense, *imp.* sehakȣe, *f.* se, *n.* sere.

Gannaχȣeñon, P. S. *être en colere*, *se dépiter; pr.* ens, *imp.* enskȣe, *f.* en, *n.* ioreseg.

Sic composita a verbo eñon, *arriver*, habent en in futuro.
Gateñon, *n'obeir pas;* tens, ten, tensere.

ION PRO INDICATIVO HURONICO.

Gahoña^{c}rion, *canot verser;* ris, riskȣe, rinne, risere.
Ka^{c}rion, *s'user;* " " " "
Ga^{c}rion, *verser de liquore;* " " rire, "
Gannontakȣion, *estre saoul*, *detêter.*

ONON VEL *OON* PRO *ONDI.*

Gaskoon, *tomber dans l'eau;* P. Ch. os, oskȣe, onne, osere.
Ateroñon, *avair peur;* P. S. ons, onskȣe, onne, onsere.
Gasoñon, *pr.* sas, *f.* sa, *n.* saanne, *achever.* Atsoñon, *estre achevé.*

VERBA IN *GON,*

habent *pr.* in ks, *imp.* kskȣe, *f.* ag, *n.* aχe.

Garihȣanderaχon, *pecher;* P. Ch. raks, raksȣe, rag, raχe.
Gaiagon, *couper;* P. Ch.
Ennitiagon, *porter au col quelque chose.*
Esagon, *chercher;* saks, sag, saχe.
Excipe : Gagȣegon, *estre ensemble,* quod habet in fut. aff. et neg. gonhag.
Gennhongon, *aller chercher,* P. S. quod habet *f. n.* in kse.

VERBA IN *RON.*

Alia habent in *præsenti* rhe, in *fut.* r, in *f. n.* anne.

Gentenron, *avoir pitié de quelqu'un;* P. S. gitenrhe, egitenr, egitenrhanne.
Enron, P. S. *laisser;* ensk, enr, enranne. Et
Arihȣenron, *laisser, emettre une affaire.*
Garonhiahenron, *apeller;* rhe, r, ranne.

Alia habent *præsens* in onsk, *f.* on, *n.* ronne : sic Atonriaron, P. Ch. *arroser d'eau medicinale.*

Alia habent *præsens* in ons, *f.* in re, *n.* in reseg : sic Gannon^{c}karon, *tondre quelqu'un; pr.* ons, *f.* re, *n.* reseg.

Gannogaron, *estre malheureux, haïr;* res, re, rese.
Oron et composita Ennonhȣaroron, *avoir un bonnet.*
Iondiron et composita habent in *fut.* rha :
Orihȣandiron, *chose affermie; s.* ejorihȣandirha.

RION.

Atsenrion, *avouer;* P. Ch. ries, rieskȣe, ri, risere.
Gaiataterion, P. S. *faire une bonne rencontre; pr.* teres, *f.* teri v. terenne, *n.* teresere.

VERBA IN *SE,*

tam relativa quam non, habent in *præsenti* et *fut.* se, in *n.* sere.

Asense, *tomber à quelq.*
Garihȣaȣase, P. S. *prendre le soin des affaires de quelq.*
Gaiennaȣase, *aider quelqu'un.*

AON.

Atkaon, *cesser;* kaȣas, askȣe, *f.* kao, *n.* ȣasere.
Ateȣhaon, cum redup. *guerir.* Tsisateȣhaon, *tu t'es gueri;* sesateȣha, *tu gueriras; n.* te sesateȣhasere.
Entoraon, *se lasser; pr.* torha, *f.* toren, *n.* toranne.

ȣAN.

Tȣatrakiȣan, *mettre des nippes à ses jambes, souliers;* ras, *f.* kiȣe.
Garageȣan, *effacer;* ȣas, *f.* eo, *n.* ȣasere.

Destructivum, gȣan vel kȣan.
Ategȣan, *s'enfuir;* gȣas, go, gȣasere.
Oseragȣan, *passer l'hyver;* gȣas, go, gȣasere.
Onhȣentsiagȣatagȣan, *redresser la terre*, cum redupl., v. gȣatongȣan.
Ogȣan, *tirer de l'eau;* ab O, *il y a de la liqueur.*
Gata^{c}kȣan, *tirer dehors;* kȣas, ko, kohe; ab Ataa, *mettre dedans.*
Atitakȣan, *se debarquer;* ab Atit, *s'embarquer.*

SION DESTRUCTIVUM.

Atseronnia^{c}sion, *se deshabiller;* *pr.* sionst, *f.* si, *n.* sionnhe; ab verbo Atseronni.
Ara^{c}ta^{c}sion, *se dechausser ses souliers.*
Atrataȣita^{c}sion, *oster son capot.*
Tȣatrakiȣa^{c}sion, *oster ses bas.* Gannerer^{c}sion, *deslier.*

EN.

Ex iis multa sunt irregularia.
Gaien, *possidere;* P. S. *imp.* takȣe, *f.* tag, *n.* tanne; reliquis significationibus e P. A.
Gaien, *y avoir;* takȣe, *f.* tag.
Quædam composita a gaien addunt *t* in fine infinitivi.
Atient, *s'asseoir;* ensk, en, enne. Atrendajent, *prier.*
Gahasent, *tenir conseil;* *pr.* et *f.* en, *n.* tag, tanne.

IN *GEN*,

faciunt præsens in χa, *fut.* in g, *f. n.* ganne.

A^{c}rongen, *entendre;* P. C. Ga^{c}ronχa, ega^{c}rong, tegaronganne.
Attogen, *se sentir mal;* P. S. χa, g, ganne.
Excipe Gandigon^{c}ratogen, v. gandigon^{c}ratogeñon, S. gens, genskȣa, genne, gensere, ogen, *un canot faire eau;* *pr.* igogas, *f.* egoχa, *n.* tegogasere.

IN *GANNEN* v. *GENNEN*,

habent *pr.* gennha, *f.* genn, *n.* gennande.

Aseragennen, *disputer pour avoir une hache:* Gaseragennha, egaseragenn, te gaseragennanne.
Onhȣentsiagannen, *debattre à qui aura une terre;* nha, nn, nanne.
Atȣagannen, *parler une langue étrangère.* Atsagannen, idem.
Atiatoχȣannen, *engloutir un animal.*
Gaieren, *faire, dire;* gierha, engiere, gieranne. Sic Atieren, *faire.*

IEN.

In ien sunt irregularia:
Gagarien, *manger;* riask, ri, rihe.
Kaien, *jouer;* jensk, *f.* en, *n.* enne.
Gannien, *abboyer;* *pr.* et *f.* niha, *n.* nianne.
Kaχen, *estre jumeaux* : Te hieχen, *ils sont* 2 *jumeaux.*

In compositione, sic inflectes :

Kannehȣaχen, *joindre 2 peaux :* Te gnehȣaχes, χa, χase.

Gannesen, *lier;* rensk, ren, renχe.

Et alia pro quibus nulla potest dari regula generalis.

Aterijen, *se chauffer;* P. Ch. ens, en, enne.

In *HON* pro *HȣI* huronico, et *AON* pro *ȣI*.

In hon pro hȣi, habent *pr.* ask, *f.* hȣe, *n.* hosere.

Gaserhon, *verser de l'eau; pr.* rast, rehȣe. Gannigoserhon, *baptiser.*

Okaon pro Okaȣi, *mattachier;* kask, ka, te sokaȣhe.

Otarhon pro Otrahȣi, hosk, ho, hosere. Ontarhon, *mettre dedans.*

Tagendigon^c^rontarho, *infunde nobis animum.*

Excipe :

Gannaȣi, S. *pescher abondamment;* ȣisk, ȣi, ȣisere.

Gaiageñon pro gaiagenhȣi, *mettre dehors quelque chose;* ensk, enȣe, ensere.

Asohon pro asohȣi, *teindre de quelque couleur;* ons, on, onne.

T.

In at, habent *pr.* at, *imp.* atakȣe.

Gandigonrat, *avoir de l'esprit :* S. agendigoñrat, *j'en ay.*

Iȣat, *il y a dedans quelque chose :* Iȣatakȣe, *il y avoit.*

In et, habent θa, teñ, tanne.

Endet, *fovere in sinu;* χenneθa, eχenneten. Iaten te χennetanne.

Gasȣannet, *couvrir de plusieurs habits.*

In ȣt, Gahonrȣt, θa, ten, tanne.

In ent, habent *pr.* ent, *imp.* entakȣe, *f.* tag, *n.* tanne.

Kaga^c^karent, *avoir deux yeux.*

Nota verba fere omnia in at, et, it, ȣt, ont, habere duplex præsens, pro duplici ratione ; quando res actu significatur, habent pro finale t ; quando habitus, habent θa, v. g.

Atsat, *montrer :* Ihotsat, *ostendit actu;* hatsaθa, *solet ostendere.* Primum est Parad. S ; 2, Parad. Ch.

Sic Atit, *s'embarquer;* Ihotet, *il embarque;* Hatiθa, *il a coutume de s'embarquer;* Gaiatit, *être embarqué*, vel *embarquer quelque chose.*

Nota 2. Pro diversa præsentis significatione variari in futura :

Gaientȣt, *il y a un baston planté :* Egatentȣtanne, *il y aura;* hajentȣθa, *il plante un baton*, ehajentȣten.

Ergo pro actu dices in illis verbis in præsenti t, in *f.* tanne, *n.* tasere ; pro habitu, dices in *pr.* θa, in *f.* ten, *n.* tanne.

Sic Atiront, *tirer :*

Gatiront, *je tire actu;* egatirontanne, tegatirontasere.

Gatironθa, *je tire habitu;* egatironten, tegatirontanne.

Gaskont, *rostir; pr.* gaskont vel gaskonθa, *f.* egaskontanne v. egaskonten, *n.* jaten tegaskontasere v. tegaskontanne.

Gaȣennont, Atȣennont, Ch. θa, ten.

TE PRO *TA.*

Okte, *finir, abboutir; pr.* ta, *imp.* takse, *f.* ten, *n.* tanne.
Ennisrokte, *jour finir.*

TI.

Gannagsati, *semer pour quelqu'un; pr.* tisk, *f.* tars, *n.* tire.
Gaiotati, *empecher quelqu'un;* tisk, ts, tire.
Aθontati, *obeir à quelqu'un;* tisk, ts, tire.
Excipe Atati, *parler;* tisk, ti, tianne.

TION,

habent *præsens* ties, *f.* ti, *n.* tiesere.

Ation, *jetter, abandonner.* Gaiatontion.

STON,

habent *præsens* θa, *f.* t, *n.* tanne.
Garihsioston, *croire;* grihsiosθa, egrihsiost, egrihsiostanne.
Gagonnienston, *estimer, priser.*

θON.

Gaienθon, *avoir des champs;* Ch. *p.* θosk, θo, θosere.
Gannhonθon, *donner quelque chose dans la bouche de quelqu'un.*
Gaskonθon, *mettre quelqu'un au feu;* θosk, θo, θosere.

Verba in O sunt omnia fere irregularia.
Gario, *tuer, blesser;* rios, rioske. rio, riosere.
Gancdio, *germer;* nios, nio, niohe vel niosere. Non constat t.
Gancnio, *passer quelqu'un en canot;* R. jungitur semper particula motus.
Ganniohon, *pr.* he, henn, ha, hase.
Igo, *il y a liqueur; f.* egoha.
Gasendio, *estre maitre;* gesendio, egennen; *j'estois le maistre,* gesendio, egenhag vel esaton, *je seray le maistre.*

Verba in ton, quorum particula ton signat causalitatem, faciunt *pr.* in θa, *f.* t, *n.* in tanne, v. g.:

Ategaton, *faire du feu,* P. Ch.
Gatsienton, *guerir,* cum reduplic. θa, t, tanne.
Gannasenton, *descendre la rivière.*
Gannonsireχton, *tomber dans un abysme,* P. S.

Quando vero ton non significat causalitatem, habent *pr.* s, *f.* t, *n.* θe.
Atketaton, *porter;* Ch. *pr.* tats, tat, taθe.
Gannagsaton, *fouyr,* Ch.
Ennograton, *s'habituer,* S.
Aθoraton, *avoir froid,* P. S.
Aθontaton, *escoutter,* Ch.
Oseraton, *l'hyver venir,* S.
Tsatonton, *se mettre plusieurs ensemble.*
Tehontons, *ils sont à un même plat.*

IN *ON*,

non habent certam terminationem præsentis et futuri, quare nulla regula generalis dari potest.

Gandoron, *estre important;* S. *pr.* on, *f.* on, *n.* onne.
Garihȣannonton, *interroger;* Ch. onsk, on, onsere.
Aton, *estre possible;* S. ton, ton, tonre.
Gasennion, R. nies, ni, nionhe.
Gagarennion, Ch. nies, ni, nionhe. Sic Kandigonᶜkennion, *tromper.*
Onharon, *sarcler;* onsk, on, onne.
Genteron, *estre;* P. ron, *f.* tag.
Genheioñ, *mourir;* onsk, heie, hejonsere.

Verba in on, significantia motum, præsens et aoristum eodem modo se habent, terminant in es vel e, *imp.* enn vel eskȣe, *f.* a, *n.* ese.

E quidem ad significandum actum, *es* habitum.

Hon : Gagohon, *aller querir;* kkohe, *je vais querir;* kkohes, pro habitu ; *f.* ekkohe ; *n.* ten, tekkohese.

Ron : Gannaθaron, *aller visiter.*

Non : Anendajennon, *aller prier; pr.* et *aor.* nne, *f.* nna, *n.* nese.
Gaienᶜnon, *aller mettre, porter.*
Genteronnon, *aller conduire quelqu'un.*

Son : Ennihason, *aller emprunter.*

Xon : Garontiaχon, *aller couper un arbre ;* χe, χa, χese.

Θon : Aθontaton, *aller ecouter.*

REGULÆ COMMUNES PRO OMNIBUS VERBIS.

PRO IMPERFECTO.

Præsens in A, E, O, habent *imp.* in kȣe ; ut,

Gnegirha, *je bois de l'eau :* Gnegirhakȣe, *je buvois.*
Gonnhe, *je vis ;* gonnhekȣe, *je vivois.*
Garonto, *il y a un arbre dans l'eau ;* garontokȣe, *il y avoit.*

Excipe ea vocabula quæ numeralibus junguntur :

Te ȣennisrage, *il y a deux jours ;* te ȣenniseragennen, *il y avoit.*
Te garihȣage, *il y avoit 2 affaires ;* garihȣagennen.

Verba in t addunt nnen :

Gienteri, *je connois ;* gienterinnen, *je connoissois.*
Tegni, *deux ;* tegninnen, *il y en avoit deux.*

Sic quædam infinitiva quæ usurpantur ad significandam 3ᵃᵐ personam passivam :

Gaserondi, *cela est accommodé ;* gaseronninnen, *cela estoit.*
Ia neθo te gaieren, gaierennen, *cela n'etoit pas ainsi.*

Præsens in ask, ensk, osk, onsk, habet imperfectum addendo ȣe :
Grihȣanderask, *je peche;* grihȣanderaskȣe, *je pechois.*
Ratrendaiensk, *il prie;* ratrendajenskȣe.
Gnaarhosk, *j'ecris;* gnaarhoskȣe, *j'ecrivois.*
Gienseronsk, *j'escorche;* gienseronskȣe.

Præsens in isk habet imperfectum in akȣe :
Raseronnisk, *il fait des haches;* raseronnihakȣe.

Præsens in s habet imperfectum in skȣe :
Ronnȣseras, *il est galleux;* ronnȣseraskȣe.

Præsens in t habet imperfectum in takȣe :
Iȣat, *il y a dedans;* isatakȣe.

REGULÆ PRO VARIIS TEMPORIBUS ET MODIS.

Quando nescis futurum negativum, utere præterito cum negatione, v. g. Iaten te rotention, *il ne partira pas.*

Quando actio continuata jungitur motui, exprimitur per hatie vel atie additum finali infinitivi :
Gatrendajentatie, *je vais priant.*
Gatrorihatie, *je vais racontant.*
Assen nihatihatie, *ils vont etant trois.*

Additur s huic hatie, ad exprimendum habitum :
Hatigȣegonhaties, *ils sont toujours ensemble.*

Ex activis fiunt passiva præfigendo at 1ae personæ præsentis indicat. ablato g. :
Gaseθa, *je cache;* gataseθa, *je suis caché.*
Otennoronkon, *res est factu difficilis;* a Gandoronkon.
Hotonnheton, *il est mis au monde;* ab Onheton, *donner la vie.*

Excipe 1° verba 2ae conjug. inchoata a gag :
Satkonsagetȣten, *montre ton visage;* pro sategonsagetȣten.

2° inchoata a gah, habent eamdem crasim :
Aχȣendori pro Atchȣendori, ab Gahȣendori, *battre une isle pour tuer les bêtes qui y sont.*
Atkoñannegen, *canots être près l'un de l'autre;* pro Atchoñannegen a Gahoñannegen, *mettre les canots aupres l'un de l'autre.*

3° inchoata a gaȣ :
Atȣennarakon, *etre obei,* pro Ateȣennarakon.
Atȣendioston, *se rendre maistre;* pro Ateȣendioston, a Gaȣendioston.

Nota quod 2a conjug. transeunte in jam, fit passivum verbum ex activo; v. g. : Aserondi, *s'accommoder,* a Gaseronni, *accommoder.*

Ex his passivis fiunt reciproca per additionem alterius at, v. g. :
Atatasecton, *se cacher soymême,* ou *s'entrecacher l'un l'autre;* ab Atasecton, *estre caché.*
Atatrihonnianni, *s'entreseigner;* ab Atrihonnianni.

Hæc verba reciproca sunt frequentissima in verbis relativis ad significandum infinitivum, v. g. :

ȣatiesen, atatriaahose, *facile est sibi mutuo scribere.*

Item ad significanda substantiva, ut :

Gandoron atatrihonnianni, *instructio difficilis est*, seu *difficile est alios docere.*

Nota hæc reciproca usurpare fere in omnibus relativis ad significandum infinitivum, vel nomen verbale quod pro infinitivo exprimitur, v. g. :

Agȣegon jennonhȣes atatronhioenton, *tous aiment d'estre caressés;* pro Garonhiaenton.

Verba deponentia sunt quæ licet habeant initiale at, quod est nota passivæ vocis, active tamen sonant :

Hatennhas, *il commande;* a relativo Gannhaon.

Hatetsiens, *il guerit*, *est medecin;* a rel. Gatsienton.

Hatrios, *il combat;* a rel. Gario, *battre.*

DE POSTPOSITIONIBUS *KON*, *STON* & *TON*.

Tres istæ particulæ adduntur verbis ad significandum causalitatem, vel formalem vel materialem vel efficientem aut finalem.

VERBA QUÆ ADDUNT ᶜ*KON*.

1° Ea quorum infinitivus desinit in A; v. g. Garakon, *mettre quelque chose*, a gara, *mettre dessus.*

2° Ea quorum infinitivus et præsens desinunt in E, v. g. Onnhekon, *vivre de quelque chose;* ab onnhe, *vivre.*

3° Ea quorum infinitivus desinit in on et præsens in onsk, v. g. Gahiatonkon, *escrire avec quelque chose;* ab Gahieton, *escrire.*

Excipe Aton, *perdre*, et Aton, *devenir*, quæ addunt particulam ton, non vero kon. Sic dices Atonton, *perdre*, *egarer quelq.* non atonkon.

4° Finita in T addunt akon, v. g. Gahasenᶜtakon, *tenir conseil de quelque chose;* a Gahasent, *tenir conseil.*

5° Verbis quorum præsens terminatur in θa vel sta, v. g. :

Gaθeθakon, *piler avec quelque chose;* a præsenti geθeθa, *je pile.*

Garihȣiostakon, a præsenti Grihȣiosta, *j'escris.*

His adde Genteron, *estre;* gageron, *estre plusieurs;* gaien, *avoir*, quorum futuris in tag additur kon, sublato g, v. g. :

Gaientakon, *cela est pour cela.* Θennon esitrontaᶜkon, *pourquoy es tu là?*

VERBA QUÆ POSTPONUNT *STON*.

1° Composita ab jo, quod significat magnitudinem, addunt ston; ut,

Garihȣioston, *faire estat de quelque chose;* a Garihȣa, *chose*, et io, *grand, important.*

2° Verba quorum præsens desinit in ens, ut :

Gandigonᶜratogenston, *scavoir par le moyen de quelque chose* ou *personne.*

Gannhatenston, *faire regretter quelqu'un :* Gannhaten, *regretter.*

Tonsaȣatogenston, *se demarier pour quelque chose;* naie tetsiontogensθa, *on se.*

3° Finita in ton, quorum præsens desinit in ts, v. g. :

Gannagȣaston, *fouyr avec quelque chose;* a Gannagȣaton, gnagȣats.

RELIQUIS VERBIS POSTPONITUR *TON*, MODO SEQUENTI.

1° Terminata in aon, eñon, oon, mutant has finales in ton, v. g.:
Gannhaton, *faire louer;* a Gannhaon.
Garonhiagenton, *faire souffrir;* a Garonhiageñon.
Gaskóton, *faire noyer;* a Gaskóon.

Excipe A^c^taston, *se saouler de quelque chose:* ab A^c^taon, *se saouler; pr.* agatas.

Kataston, *se lever debout pour quelque chose;* a Kataon, *pr.* tektas.

2° Desinentia in on, gon, ȣi, hon et ron, mutant finalem syllabam in ton, v. g.: Gasaton, *achever tout;* a Gason, *accomplir.*
Garihȣanderaton, *faire pescher;* a Garihȣanderogon, *peccare.*
Gaserhaton, *arroser avec quelque chose;* a Gaserhon.
Ganniraton, *affermir;* ab Jondiron, *cela est ferme.*
Asohe^c^ton, *teindre avec quelque chose;* ab Osohon, *teindre.*

3° Terminata in en, gen, hen, mutant illud in aton, v. g.:
Askannaton, *faire desirer;* a Gaskannhen, *desirer.*
Arongaton, *faire entendre quelque chose;* ab Arongen, *entendre.*
Atehaton, *hontoyer quelqu'un;* ab Atehen v. Ateheiion, *avoir honte.*
Garihȣaksaton, *rendre mauvaise quelque chose;* a Garihȣaksen, *res mala.*
Gaieraton, *faire avec quelque chose;* a Gaieren.

Excipe Katenston, *faire prendre l'essor;* a Katen, *s'envoler.*

Kajatorenston, *findere aliquod animale en* 2; a Kajatoren.

4° Desinentia in O addunt ton, v. g.:
Garioton, *tuer avec quelque chose;* a Gario, *tuer.*

5° Finita in ȣan, kon, χon, mutant an et t in ati, v. g.:
Ategȣaton, *faire fuir;* ab Ategȣan, *fuir.*
Gannoronkȣaton, a Gannoronkon, *estimer, priser.*
Gaienθoton, a Gaienθon, *avoir des champs.*

6° Terminata in on, quorum præsens est es v. onsk, mutant illud in aton, v. g.: Gagarenniaton, *eloigner avec quelque chose;* a Gagarennion, *pr.* es.
Genheiaton, *faire mourir;* a Genheion.

7° Desinentia in e, quorum præsens est ek, addunt ton, v. g.:
Gagaȣeton, *nager avec quelque chose;* a Gagaȣe, *nager.*
Gaieton, *suscitare;* a Gaie, *susciter.*

At dices Gannistiageston, *faire uriner;* a Gannistiage, *uriner.*

8° Onni, ori cum compositis, et atatri, sumunt aton, v. g.:
Gaseronniaton, *faire avec cela;* a Gaseronni.
Atoriaton, *chasser avec ch.;* ab Atori.
Gandigonroriaton, *divertir avec quelque chose;* a Gandigonrori.
Atatiaton, *parler avec cela;* ab Atati.

NOTA Illas particulas significare in locum:

θo hatientakȣa, *il demeure là.*
ka θojenta^c^kon, *d'où vient il?*
ken etiontaȣiatakȣa, *c'est par là qu'on entre.*
θo hajenθoθa, *c'est là où il fait ses champs.*

Sic dices Nongati igandaȣatekon, *de l'autre coté de la rivière.*
Θo hereθa, *c'est le lieu où il va.*

Ton et kon significant etiam tempus, v. g. :
Onnaie isro sinni ongȣatentiaton, *rediit quando profecti sumus.*
Naie hondatikakon, *le jour qu'ils se sont embarqués.*

Significant etiam materiam ex qua fit aliquid, et instrumentum quo fit :
Tsonnito hatinnonȣaroseronniaθa, *ils font des chapeaux avec le castor.*
Naie esakonserakȣa, *tu te serviras de chevet.*

Causam finalem : Naie gakonθa, *ideo dico hoc.*
Naie goñjarontonkȣa, *ideo te interrogo.*

Formalem : Naie tionnhe[c]kon nongȣatonnheston, *notre ame nous fait vivre.*

DE FORMATIONE VERBORUM RELATIVORUM.

Verborum alia sunt simpliciter, et per se relativa ; alia fiunt relativa, additione aliquarum syllabarum vel litterarum.

1° Verba ex absolutis possunt fieri relativa additione particularum causalitatis ton, ston, kon ; ut,
Ategȣaton, *fugare aliquem;* ab Ategȣan, *fuir.*
Akhaton, *hontoyer quelqu'un;* ab Ataheñon, *estre honteux.*
Gaiataksaton, *rendre laid quelqu'un;* a Gaiatakseñon, *estre laid.*

Ab A fiunt relativa in Anni v. Enni :
Garanni, *donner à manger à quelqu'un;* a Gara, *f.* rhas.
Gaθaranni, *quereller quelq.* Asongȣatarhas, *il nous a.*

Excipe Garaȣi, *couvrir quelqu'un;* hakraȣi, *il m'a couvert;* ehakrase, *il me couvrira;* a Gahra, *mettre dessus.*

Ab Eñon, fiunt relativa in Ase :
Gannaχȣase, *irasci alicui;* a Gannaχȣeñon.
Atehase, *etre honteux pour quelq.;* ab Atehenon.
Garihase, *bouillir pour quelq.;* ab Orihen.

A ton, cujus præsens in ts :
Gannagȣati, *semer pour quelq.;* tisk, ts, tire, a Gannakȣaton, *semer.*
Arati, *coucher aupres de quelq.;* tisk, ts, tire, ab Araten, ts, t, θi.
Ennonhȣeti, *coucher avec quelq.* (in malam partem) ; ab Ennohȣeton.
Aθontati, *obeir à quelq.*;. ab Aθonti, *estre attentif.*
Aθorati, *chasser pour quelq.;* ab Aθoraton, rats, rat, raθe.

Verba in Gȣan fiunt relativa addendo ni in infinitivo, et mutando n in s pro futuro affirmativo :
Garagȣanni, *oster de dessus pour quelq.;* a Garagȣan, esaragȣas, *on te.*
Garontageskȣanni, *lever un arbre à quelq.; f.* kȣas.

A verbis in gon fiunt relativa in gi :
A Garontiagon, *couper un arbre;* Garontiagi, *scindere alicui.*
Ab Esagon, *chercher;* Esagi, *chercher à quelq.*
Tagȣasaks, *cherche moi,* v. g. *des pommes.*

NEUTRO ACQUISITIVA.

Atonse, *estre possible à quelq.;* ab Aton, *estre possible. Fut.* Esatonse, ken. *Poterisne?*

Asensa, *tomber à quelq.;* ab Aseñon, *tomber.*

RELATIVA FIUNT AB ABSOLUTIS.

Ateȣejentonni, *garder à quelq.; f.* tonhas, ab Ateȣejenton.
Arontatse, *souffler pour quelq.; f,* ts, ab Arontaton.
Aratȣe, *conter pour quelq.; f.* ts, ab Araton.
Gannagȣatse, *semer pour quelq.;* a Gannagȣaton.
Garontiakse, *couper un arbre pour quelq.* a Garontiagon.
Gaiennaȣase, *aider quelqu'un.*
Tȣatontonse, *se jetter sur quelq.; f.* onsen, a Tȣatonton.
Garihȣagaratatse, *reciter à quelq.;* a Gariȣagaraton.

En mutatur in ATON :
Kasterihaton, *presser quelq.;* a Kasterihen.
Garihaton, *faire bouillir à quelq.;* ab Orihen.
Ategaton, ab Ategen, *il y a du feu.*
Kagasaiatanni, *retarder quelqu'un en chemin;* a Kagasaien.
Gaieraton, *servir de quelque chose;* a Gaieren.

Excipe Atsinnhaston, *se lier avec quelque chose;* pro Atsinnhaton, ab Atsinnhen.

Gon finale mutatur in KTON, v. g. :
Gaiatannentagon, *estre attaché;* Gaiatannentakton, *attacher.*
Tȣenron, *laisser quelque chose,* v. g. *de son discours,* relativum entsi.
Niahoθennon te skȣentse, *tu ne m'as rien laissé.*
Gatagȣentse, *laisse moi.*

RELATIVA AB *EN.*

Kaχenni, *joindre pour quelq.; f.* χas, a Kaχen.
Gaienni, *mettre pour quelq.; f.* enhas, a Gaien.

Verba finita per HASE particulas fieri possunt relativa mutando EN finale in ANNI pro *præter.*, et in EN pro *fut. affirm.:*

Gaθeθanni, *piler à quelq.;* a Gaθeθon.
Garakȣanni, *mettre dans un plat à manger à quelqu'un;* a Garakon.

Verba in A fiunt relativa addendo NI *præter.*, et *fut.* rhas :
Garanni, *mettre dessus dedans à quelq.; f.* tagerhas, a Gara.
Verba in ȣAN addunt NI pro *præterito,* et pro *futuro* s ; ut,
Garagȣanni, *oster dessus à quelq.;* a Garagȣan, *f.* tagragȣas.
Verba in GON fiunt relativa mutando GON in ASE vel AKSE :
Garihȣanderase, *faire pecher quelq.;* a Garihȣanderagon.
Garontiakse, *couper un arbre à quelq.;* a Garontiagon.
Finita in HON mutant N in SE :
Gannaarhose, *escrire pour quelq.; f.* a Gannaarhon, *escrire.*

Composita ab ONNI et ORI addunt ANNI in *prœt.*, et in *fut.* EN :
Gaseronnianni, *faire pour quelq.;* a Gaseronni.
Garihonnianni, *troubler quelq.;* a Garihori, askrihorien, *tu me.*

Finita in T fiunt relativa addendo ANNI v. SE, *f.* S :
Gaskontanni vel Gaskontase, *faire rostir à quelq.;* a Gaskont.
Atsatanni, *montrer à quelq.; f.* Egatsaθas, ab Atsat.

Ab ATION, *jetter*, et ONTION in compos. :
Atiense, *jetter à quelq.; f.* tiens.
Kagasiase, *separer à quelq.; f.* kaχasion.
Atriose, *se battre pour quelq.;* ab Atrio.
Oskaranni, *f.* oskaras, ab Oskaron, tagrenhosχaras, *esbranche moi des arbres.*
Atentiase, *partir pour quelq.; f.* egonjatenties, *je partiray pour toi.*

Finita in θON mutant illud in θOSE pro relativo :
Askȣaserenθos, *tu as usé ma hache;* ab Aserenθose, *user une hache à q.*

PRO NOMINIBUS.

Nomina non inflectuntur per casus, atque adeo non patiuntur ab alio nomine, neque ab ullo verbo vel præeunte vel sequente ullam mutationem, nisi cum illo intrent in compositionem, v. g. :

Ontak, *chaudière*, sive præponatur sive postponatur verbo ȣagiehȣas, *j'ai besoin*, idem prorsus manet dicesque : Ontak ȣagiehȣas vel ȣagiehȣas ontak.

Duo substantiva simul juncta, sic exprimas :
Le livre d'Orite, Orite aorihȣa.
La maison d'Asendase, Asendase ronnonsto.

Appellativa sic exprimunt pro verbo :
Le Capitaine des Iroquois, Hotinnonsionni θoaȣennaganᶜnere ; id est, *Iroquois habent illum in Dominum.*
Le neveu de Garihȣatiron, Garihȣatiron haȣenhȣaten, seu *il l'a pour neveu.*
Le frere d'Orite, Orite hiatatageña; id est, *Orite et luy sont frères.*

Nomina nationalia formantur a nomine proprio nationis, addendo illis RONNON vel HAGA, sic : Ganniegeronnon vel Ganniegehaga, a Ganniege.

Nomina verbalia qualia sunt *l'amour*, *le peché*, *la crainte*, exprimuntur vel per infinitivum, ut : *Dieu hait le peché*, Diȣ rasȣense ne garihȣanderon; vel per impersonale, Diȣ rasȣense njeriȣanderask; vel per personale, Diȣ rasȣense niagȣarihȣanderase.

Nomina derivativa ab adjectivo, v.g. *la beauté*, *la laideur*, sic efferuntur: Jaχinnonste njontχenniata, id est, *nous aimons les beaux;* Jaχesȣense nieiatakseña, *nous haissons les laids*, quæ per adjectivum exprimuntur; vel per nomina significantia actionem et passionem, v. g. a Gannaarhon, *escrire*, fit Gannaarhontsera, *escriture;* a Gannenskȣan, *desrober*, fit Gannenskȣatsera, *larcin;* vel etiam aliquando formant hujusmodi substantiva ab appellativis, v. g. ab Onnhetien, *femme*, Onnhetiensera, quasi diceres *feminin.*

SYNTAXIS SUBSTANTIVI CUM ADJECTIVO.

Quoniam substantiva quædam subeunt compositionem, quædam vero non subeunt, diversa est etiam earum syntaxis.

Substantiva quæ componuntur, in eo conveniunt cum adjectivis quibus junguntur quod induant naturam eorum paradigmatis, v. g. Gannons agatste, *cabane de durée*, Parad. Chi, quia gagatste est illius paradig. Si vero Gannonsa componatur cum adjectivo Iondiron, *fort*, dices Onnonsondiron, *cabane forte*, quia Iondiron est Paradigmatis S.

Substantiva quæ non componuntur conveniunt genere, numero et perrsonâ cum suo adjectivo, v. g. Ratsinn, *mas.*, si adjectivo Gatsatste, *fort*, adhærent, dices Ratsatste cum initiali R, quæ est nota 3ae personæ masculinæ. Si vero Onnhetien sit subjectiva, illius prædicti dices Gatsatste.

Nota Componi tantum nomina generica et specifica, non autem nomina individuæ contenta sub genere et .. ne, v. g.:

Garonta, *arbre;* Garontio, *bel arbre.* ...ariton, *chesne* non componitur.

RADICES VERBORUM

1ae CONJUGATIONIS.

A, significans *grandeur : imp.* asaȣa, *f.* egaska.

Sing. Kenniga, *ie suis grand comme cela ;* isa, ita, iaga, iȣa de rebus inanim.

Dual. Sateiagna, satetna, satesna, satehna, sategna.

Plur. Sateiagȣas, etȣas, esȣas, ehonnas, egonnas.

Θo niaga neksaa, *combien grand sont les enfants.*

Egajas dicitur de hominibus ; sed de rebus inanimatis et aliis, dicitur eȣas.

De duobus tantum dices Satenna vel Sateȣa, *aussi grand l'un que l'autre.*

Tegni ȣatario okȣari kennasateȣa, *il a tué deux ours d'égale grandeur.*

A impersonale, *y avoir en telle quantité ou grandeur.*

Iaten neθo teȣa, *il n'y a pas tant que cela.*

Niθo nisȣa sinni θaskȣa jesannonten, *il y en a encore autant qu'on t'en a donné.*

Ne θo sinn iȣa, *il y en a assez : cela est assez grand.*

Sȣaska, diminutivum.

A in compositione. Nigannatsia, *grande chaudière;* Nigannatsaa, *petite chaudière ;* Nigannatsias, *de plusieurs chaudières.* Kennigannatsias : *imp.* Gannatsiaskȣa, *f.* Kennigannatsiaska.

Nihaȣenda, *grosse voix;* Nihaȣendaa, *petite voix.*

A in comp., *prendre :* ȣagonnetsa, *je te prens par le bras;* ȣagonhoña, *je prends ton canot.*

Aga, *ramasser des fesoles, pommes de terre :* inusitatum nisi in præsenti; *imp.* son : Jonχas, *on en cherche.*

A significans *arriver*, v. Conjugationes.

A significans *prix, valeur.* Sategna gasire ne isonnito, *une couverte vaut un castor.*

Agannon, *en aller chercher* : ne *pr.* et *fut.* gaganne, *je vais chercher;* hondagannon, *ils en sont alles chercher.*

Agaraon, S. *estre nuit; en estre surpris*, ras, rahȣe, raseg.

Etiogaras, *il fait nuit.* Onne ȣaogaraȣe, *il se fait nuit.*

Agoraton, *causer la nuit.*

Agaratanni, *oster le jour à quelqu'un;* R. *f.* ten.

Satonnek eskȣatagaraten, *retire toi, tu m'otes le jour.*

Agaraon, S. cum reiter : *voir encore la nuit, passer encore le jour*

Tsiongȣagaraon, *nous sejournerons encore aujourd'hui.*

Agarion, *faire des trappes aux lievres.*

Age, particula numeralis subjunctiva quæ numerum indicat :

Θo nioserage, *Combien d'hyvers?*

Præponitur particula TE in num. duali : Te joserage, 2 *hivers;* Te gaiatage, 2 *hommes* ou *autres animaux;* Asen niganneh8age, *trois peaux.*

In *imp.* habet gennen ; in *f.* gehag : Asen nagandegorhage has, *qu'il y ait* 8 *grains de pourcelaine.*

Agenron, *manquer,* Ch. *imp.* Jogenron si renteron, *comme s'il luy.* 8agenresnon, *en manque-t-il.*

Ogenra, *cendre, poudre;* P. S. Raogenra, *sa poudre;* Honnagenra, *leur poudre.* Jaten te 8agagenraien, *je n'ai point de poudre,* 1ae conj.

Gagenronni, *mépriser;* R. nisk, ni, nianne.

Gagenronseronni, idem.

Atagenronnion, Ch. nisk, ni, nianne, *estre reduit en cendres, à neant.*

Agenrata, Ch. *charger un fusil.* Agenrat, *il y a de la poudre dedans.*

Agenratacks8an, *la tirer de dedans.*

Atagenrotag8an, *se decharger, le feu se prendre à la poudre.*

Atagenrotag8anni, *R.* steg, *f.* g8as : Ong8atagenrotag8as, *le feu s'est pris à ma poudre.*

Atragenrion, Ch. *se rouler, vautrer dans les cendres;* ries, ri.

Agon, *dedans,* in comp.; nagon, *extra,* comp.

Gannatagon, *dans le village.* Gannonskon pro Gannonsagon, *dans la maison.* Dicunt potius ongie.

Asatagon, *en secret,* comme qui diroit *jetter dans l'obscurité ce qu'on dit;* nam osata significat *nuée, fumée.*

Agon, P. O. *estre nud, vuide :* vid. in 4a conj.

Agoennagon te jennonniak8e; gagogon, jges onnatogon, *le bourg est vuide.*

Rossitagon, *il a des pieds nuds.*

Inde P. P. Recollectos vocant Hondasitagon, *ils ont les pieds nuds.*

Agraon, P. rha, ranne, rasere, *flotter.*

Jogerha, *cela flotte.* Hoiatagranne, *il va flottant.*

Hati8endogerha, *Les Hurons* (*quia in insula habitabant*).

Gahoñog-raon, Ch. rha, ranne, *canot flotter.*

Agrakon, P. A. *ce qui fait flotter; pr.* et *f.* k8a, k8anne.

A....n, S. *sentir des rapports, provoquer a vomir.*

Agoren, *un autre,* de hominibus.

Ogra, *neige; imp.* vide in fine Ogrigon.

Agreñon, Ch. *neiger, tomber de la neige;* grenns, gren, grensere.

Agratarakon, *s'etre surpris de la neige en voyage*; ks, g, χe.

Agrog8an, cum nota local. Onnei8t, g8as, go, gohe.

Atagrog8an, Ch. *cesser de neiger.* T8agriagon, *idem.*

Ag8aton, *fouir;* Ch. θa, t, θe. Onh8entsiag8aton, *fodere terram.*

Aha v. **Ahaha,** *chemin,* extra et intra compos.

Johahio, *beau chemin.* Johah8anne, vel kenn Johaha, *grand chemin.*

Ahate Johate, *il y a un chemin;* vel Johahonte, *imp.* tek8e, *f.* teg, *n.* tekse.

Ahahogen, cum nota dualit. te, *chemin fourchu;* te sohahogen v. johahogen, *chemin fourchu.*

Aθahagȣegon, S. *le chemin estre bouché.*

Aθahagȣarision, S. *le chemin estre droit;* v. Tiahonnihare.

Aθahakton, *chemin qui va de biais.*

Gahahonni, Ch. *faire un chemin.*

Gahahonnianni, R. *f.* nien; vel Gahahisaanni, R. *f.* sas. Iesȣs songȣahahisaanni ne garonhiage ionθa, *Jésus nous a fait le chemin pour aller au ciel.*

Gahaθotkaon, Ch. *faire le chemin sur les neiges.*

Aθahiton, Ch. θa, t, tanne; vel Aθahonton, Ch. *prendre, suivre le chemin.*

Aθahita^c^kon, Ch. *le lieu où l'on prend le chemin.*

Aθaharagȣan, Ch. gȣas, go, gohe; *couper chemin.*

Gahahenton, Ch. *suivre le chemin.*

Ohio, in comp.; kahik, extra comp. *fruit;* Ohiagon, *bon fruit.*

Ahisari, Ch. ris, ri, risere, *fruit mur;* vel etiam P. O. Ahiariseron.

Ahientaon, Ch. tas, tanne, tasere; *le saison de fruits se passer.*

Aθahionni, S. *y avoir quantité de fruits.*

Ahiannionten, S. *fruit estre attaché à l'arbre, pendre.*

Gahianniontagȣan, Ch. gȣas, go, gohe; *detacher le fruit de l'arbre.*

Gahianniontagȣanni, R. *f.* gȣas.

Gahiennonten, R. *donner des fruits.*

Ahiaχon, Ch. χe, χa, χese; *aller, cueiller des fruits.*

Ahiaχonse, R. tagȣahiaχonscha, *va moy cueiller des fruits.*

Ohioge, *à la rivière:* Ohioge son, *le long de la rivière;* ohioge kȣann.

Ahonta, *oreille.* Tȣahontiagon, S ks. g ke; *avoir l'oreille coupée.*

Tȣahontiagi, R. Ahonsori, R. *rompre les oreilles à quelqu'un.*

Gahonsnoren, R. *faire prendre une chose pour une autre, empecher d'estre attentif.*

Aθahonsneren, P. A. *n'estre pas attentif.*

Gahonsatogeiion, S. *estre assuré, savoir au vrai une nouvelle.*

Gahonsatogaton vel Gahontogaton, *esclaircir de la verité d'une nouvelle.*

Tȣahontagȣegon, s. gȣeks, gȣek, gȣeχe; *estre sourd.*

Tȣatahontagȣegon, *se faire sourd.*

Kahontararágon, Ch. *percer l'oreille.* Kahontararagi, R.

Ohonti, *herbe dont la feuille est un peu grande.*

Joθontonni si gonnes agosatensk, *il y a bien de l'herbe où sont les chevaux.*

Akararen, S. *estre sensible à la douleur.* Akarienni s.

Gandigon^c^kararen, s. *avoir l'esprit tendre et delicat.*

Okȣari, *ours.* Ganniagȣari, *grande ourse.* Okȣarita in comp.

Akȣari v. Akȣarigon, Ch. *empaqueter,* ris, ri; non est in usu, sed ejus loco Atakȣari, Ch. *faire son paquet.* Atakȣarise, R.

Atakȣarision, Ch. sions, si, sionné, *depaqueter;* v. Atakȣarisiongȣan.
Atakȣarisionse, R. vel Atakȣarisiongȣanni, f. gȣas.
Akȣerit, *embarquer paquet;* v. Atit.

Akȣason, Ch. *s'habiller, se vestir;* pr. et f. kȣes, n, kȣasere.
Ch. *se vestir de quelque chose;* θa, t, tanne.

Akte, *ailleurs, autrement.*

Akton, Ch. tons, ton, tonne; *aller faire un tour.*

Akta, *au bord;* Aktahe.

Okte, *bout, achever;* ȣagokten, ȣasokten.
Atokte, S. θa, ten; *estre achevé.* Atoktanni, f. θas.
Garihokte, garihoktanni.
Aterientokte, Ch. *desesperer.*

Akȣiseron, Ch. *s'efforcer;* rons, ron, ronne.
Atakȣeseron, idem a Gahȣisera, *force.*

Anno, *froid,* in comp. 2ae conj. Gaiatanno, *avoir froid.*
Gaiatannoston, S. *devenir froid;* θa, t, tanne.
Gannonsanno, *cabane froide.* Onenneganno, *eau froide.*

Annonton, inusitat; *chercher, fouiller.* 2ae conj. Garihȣannonton, Ch. *demander des nouvelles* est etiam R.; tons, ton, tonre.
Harihȣannontonskon, *importun à interroger.*

Aogon, *pur, simple.* Aogon jongȣatkaston, *nous avons fait de la sagamité sans assaissonment.*
Aogonge, *il n'y a personne; grande solitude au village, a la cabane.*

Aȣagon, Ch. ks, g, χe; *cribler, secouer.*
Aȣakton, Ch. *cribler avec q. c.* Onnaȣak, *crible.*

Aȣen, *eau,* extra comp. Onenega, in comp.
Aȣenge, *dans l'eau.* Aȣen satkaston, *ta bouillié n'est que de l'eau claire.*

Aȣenrion, Ch. ries, rie, riese; *remuer, mouvoir.*
Saȣenrie, seθaseraȣenrie, *remue la farine.*
JeθeseraȣenrieθA, *spatule.*

Tiȣenrioston, *temps sombre, couvert.*

Tȣtennagarȣt, S. *s'asseoir sur son derriere en ecartant les jambes.*
Tȣatotkȣaienneton, Ch. *s'asseoir commes les femmes q. elles jouent.*

Aȣenha, *fleur.* Aȣenhararagon, Ch. *fleurs etre épanouies.*
Aȣenhet, *fraise,* dimin.; v. Niohontesa, *petite feuille.*
Aȣenhagenrat, *chataigne.*

Aȣenrion, *mesler;* Ch. ries, rie, riese.
Erientaȣenrion, *troubler l'esprit,* R.
Aterientaȣenrion, Ch. *s'oublier;* ries, ri, ries.
Gaserentaȣenrion, *avoir eu un mauvais songe suivi d'un facheux accident.* P. O.

Aȣentaon, Ch. tas, tanne, tasere, *mourir,* de plurib; Aȣentaseron.
Aȣenθon, R. *tuer;* θosk, θo, θosere, *tuer plus.*
Ataȣenθon, *neut.* ch.

Aȣehte, Ch. *joindre quelque chose; estre avec ou au dessus du principal.*
Onnonraȣente ne gaionni, *il y a une chevelure attaché au collier.*
Asare ejaȣentek, *qu'il y ayt un couteau avec.*

Aȣentaton, *accroitre à quelqu'un.*

Aȣetarontsi, *la piece est bien mise.*

Aȣetarhon, *mettre entre deux, y avoir.*
Ganniataraȣetarhon, *un lac est entre deux.*
Gannonsaȣetarhon, *cabane est entre deux.*

Aȣenron, in comp.: Gaiataȣenron, ganonaȣenron.
Aȣenraton, *passer par dessus;* Ch. θa, t, θa, sæpius in comp. quam Aȣenron.
Gannonsaȣenraton, *sauter par dessus la cabane.*
Atenraȣenraton, Ch. *passer sur la palisade.*
Tȣataȣenron, *tour à tour;* rons, re, ronne.

Aȣeron, *vuider*, Ch. rons, ron, ronne.

Aȣerontaon, *renverser de fonds en comble.*
Gannonsaȣeronton, Ch. *renverser, ruiner la cabane.*
Atrihȣaȣeron, Ch. *se disputer.*

Tȣaȣeston, *percer.*
Atȣeston, *passer;* θa, t, θe, Ch.
Atȣestanni, R. *f.* ten.
Atȣestakon, *lieu où l'on passe.*

Aȣi, R. *donner;* ȣisk, ȣi, ȣisere.
Aȣihon, *donner à plusieurs.*
Atataȣihon, Ch. *s'entredonner,* v. conj.

Aȣiaton, *faire entrer;* Ch. θa, t, tanne; *inde* Onnisnonsaȣiat, *bague.*
Atiataȣit, *capot.*
Ataȣiaton, Ch. *entrer.*
Ataȣiatanni, R. *f.* ten.
Ataȣiata^c^kon, *pr.* et *f.* kȣa.

Arase, caret sing. Agiarase, tiarase, tsiar, hiar, giarase, agȣarase, tȣarase, &c.
Tȣarasenθon, R. *donner des coups de pied;* θosk, θo, θosere.
ȣrata, *talon.*

Arata, intra comp. *mettre ses souliers*, Ch.
Aratasion, Ch. v. Aratasiongȣan, *les oster.*
Aratasionse v. Aratasiongȣanni, R.
Karatie^c^ton, Ch. θa, t; *estre las, fatigué du chemin ou du travail.*
Tȣara^c^taton, *courir;* Ch. tats, tat, taθe. Est etiam relativum : te songȣara^c^taton, *il courut sur nous.*

Araton, *coucher;* Ch. rats, rat, raθe.
Araston, Ch. *lieu où l'on couche.*
Arasta^c^kon, *le lieu, la natte où l'on couche.*
Arati, R. *coucher aupres de quelqu'un;* tisk, ti, tire.

Araton, Ch. *compter.* Aratse, R. tagȣarats, *compte pour moy.*

Aregȣan, Ch. gȣas, go, gohe; *aller en guerre.*

N. Roregȣan, *N. est allé en guerre; est le chef de la bande.*

Jaten haregȣas, *il ne va pas en guerre* (grande injure).

Aregȣatsera, *bande de guerriers.*

Aregohaton, *diverses bandes aller en guerre.*

Areko, *pas encore.*

Tȣareron, Ch. *courir 2 ensemble à qui et.*

Aresen, S. *être gras.*

Aresenseronni, Ch. *engraisser cochons, &c.*

Aresenton, Ch. *s'engraisser de quelque chose.*

Kenniondaresen oskennonton, *les cerfs sont gras,* etc.

Gari, *meur, cuit;* utriusq. parad. 2^{ae} conj. Onne jori, *cela est cuit.*

Egarig niari, *attends qu'il soit cuit.*

Subit etiam comp. Onne onnenhari, *le blé, la sagamité est cuitte.*

Joritsihȣen, *très cuit.*

Arkȣan, Ch. kȣas, ko, kohe; *coucher en chemin, gister.*

Arongen, Ch. χa, g, ganne; *entendre, écouter, concevoir.*

Arongaton, Ch. *entendre par ou pour quelque chose.*

Est etiam R. tagȣarongat, *escoute moy.*

Arongen in comp. Hoñaȣendaronχa, *on entend sa voix.*

Arongannion, Ch.

Garihȣa^c^rongen, Ch. *entendre, apprendre quelque nouvelle.*

Oron^c^kara, S. *palme.*

Tsioron^c^karat, *une seule palme.*

Atron^c^karare, Ch. *f.* re, ren; *mesurer par palmes.*

Garon^c^karon, R. *donner une palme.*

Garonkaratise, R. Θentenhaȣiθa hoñaron^c^karatisa, *on a donné à,* etc. Ainsi dit on quand les Agoianders s'entredonnent de la porcelaine.

Arontaton, Ch. *souffler, tirer le fusil et arroser d'eau medicinale.* Est R. in omnibus ts, t, θe.

Atatarontaton, Ch. *se tirer à soimême.*

Arontetsera, *un coup de mousquet.*

Arontason, Ch. tons, ton, tonne: multipliciter significat.

Arontatston, Ch. *ce avec quoi l'on tire.*

Arosen, *escureuil.*

Asaga, Ch. ga, g; *avoir la toux.*

Asagaton, *ce qui fait avoir la toux.*

Asaganna agrios, *la toux me tue.*

Asara, *corde à lier, collier.*

Asarinnon, Ch. *traisner avec une corde,* est etiam R.

Asaront, S. *estre lié comme sont les esclaves.*

Asaronniontatie, *aller traisnant son licol.*

Atasaront, Ch. cum te affir. *lier, attacher une collier à une manne;* θa, ten, tanne : Ti satosaronten, *attache ton collier.*

Atasarontakon, Ch. *se servir de quelque chose pour attacher*, ainsi : Hoθennon te gatasarontak? *Qu'attacherai je à mon panier?*

Quand le fardeau est envelloppé de toile, on dans un sac, on dit: Satakȣari, et non pas Satasaronten.

Asara, *anse de chaudière.*

Asaront, Ch. θa, ten, tanne; *en mettre une.*

Asarontanni, R. *f.* θas.

Tontagȣasaronθas, *remets moi l'anse de ma chaudière.*

Asarontagȣan, *l'oster*, Ch. neut.

Asárontagȣanni, Neut. acq. *l'anse s'oster à quelq.*

Asarakȣa, *dessus de soulier.*

Asare, *couteau.* Agȣasare, sasare, raosare; mon, ton, son.

Asare onȣe, *couteau simple a 1 vaine.*

Atasaraseθa, *jambette*, seu *couteau qui se ferme qui se cache.*

Te ȣatasarisa^c^ks, *ciseau*, quasi diceres *couteaux qui se cherchent.*

Eθo si Johiȣθie, *le tranchant.*

Gasonne, *le dos d'un couteau.*

Asatagon, *en secret.*

Asátagon onȣati gaionni, *je donne un colier en secret.*

Ase, neuf. gannonsase, *cabanne neuve.*

Asegȣe, *epée, halebarde.* Asegȣare in comp.

Hatisegȣarenhaȣinnontie, *ils vont portant la hallebarde.*

Asen, *trois.* Satius esset ut significaret *dix*, sicuti significat apud Iroquaos superiores.

Inde autem fiunt Te ȣasen, 20, quasi 2 fois dix; Asen niȣasen, *trente.*

Porro Asen conjugat. est quc Parad. Ch. Te iagȣasen, te sȣasen, te honsen, te gonsen, *imp.* sennen, *fut.* senhag : Tsiatak niaȣenre asen niaonsenhag, 27.

Subit etiam compositionem, Te jagȣajatasen, *nous sommes* 20; Asen nigastarokȣasen, 30 *grains de rassade.*

Asensera, *dixaine.* Asenseratagȣan, Ch. gȣas, go, gohe; *reciter la dixaine de son chaplet.*

Asenserȣannen, Ch. *vendre cher.*

Asenserȣt, Ch. *dix par dessus;* ch, θa, takȣe, tag.

Skat te ȣenniaȣe tegni te josenserot, 120.

Asennonte, *petit sac que les femmes attachent à leur ceinture dans lequel est leur blé de semence.*

Aseñon, extra comp. Ch. sens, senne, sensere; *tomber.* Assumit notam localitatis, tonsenne, *cela tombe.*

Asense, neut. acq. *laisser tomber, tomber à quelq.*

Asen^c^ton, Ch. *faire tomber;* θa, t, tanne.

Asentanni, R. *f.* ten, *faire tomber quelque chose à quelq.*

Asenθa, *dossier de la natte, l'entredeux d'une cabane.*

Te gasentȣte, *il y a un dossier.*

Gasentonni, Ch. *en faire un.*

Gasentonnianni, R. *f.* nien.

Tȣasenθa, *sault d'eau,* seu *où l'eau tombe.*

Tȣasenθon, Ch. θos, θo, θosere; *gemir, se plaindre.*
Tȣasenθoseron, Ch. de multis.

Asera, *hache,* in comp.
Aserio, *bonne hache.* Aserakseñ, *mechante.*
Aseragaraon, R. *tenir la hache levée pour frapper quelq.*
Aserense, *la faire tomber sur quelqu'un.*
Aserȣθion, Ch. *l'aiguiser;* pr. et f. θie.
Aserȣtionse, R. *f.* ons. Tȣaseriagi, R. *f.* ks.
ȣateskȣaseriaks, *tu m'as rompu ma hache.* Tȣatascriagi, R. recip.
Tȣaseriakton, R. *rompre une hache par ou sur quelque chose.*
Tȣaserakȣan, Ch. P. kȣa, f. kȣa, n. kȣanne.
Onne tontajonserakȣe ganniege onsahoñajent ne ratsagannha, *L'Agnier reprend la hache pour frapper le Mahingan.*
Aseragannennaton, Ch. θa, t, tanne ; *faire divers coups, casser quantité de testes.*
Aserȣtagȣan, Ch. *satisfaire pour quelque coup.*
Tȣaseragȣanni, R. *oster la hache à quelqu'un.*
Ateserenton, Ch. *donner un coup.*
Aserȣton, *hache d'armes.*
Onteseronti, *la foudre est tombé.*

Aserahon, R. serask, ra; *donner de la pourcelaine pour remercier de quelque esclave donné.*

ȣasere, *il y a de l'eau dans le ruisseau, fontaine, &c.*

Ase^c^ton, Ch. θa, t, tanne; *cacher.* Rariȣaseθa, *il cache l'affaire.*
Jotrihȣaseton, *l'affaire est cachée.*
Ataseton, *se cacher, se mettre à couvert de quelque mauvais temps.*
Atasetonkon, *se cacher avec quelque chose.*
Gaiataseton, *cacher quelqu'un.* Gaiatasetanni, R.
Asetanni, R. *f.* ten. ȣahagrihȣaseten, *il m'a caché l'affaire.*
Atasetanni, *se cacher à quelqu'un;* R. acq.
Atatasetanni, R. recip. *s'entrecacher.*

Aseton, R. *tuer en cachette, assassiner.*

Aseton, *compter;* Ch. tas, t, tanne.
Ionsetas ondegorha onnontageronnons, *les Onnontagués comptent la porcelaine.*
Ionsetasθa, *ce avec quoy l'on compte;* sic etiam vocant *un livre.*

Asisat, *pilon,* extra comp. Asisata in comp. est 2^ae^ conj.

Askahon, Ch. ȣas, ȣe, ȣasere; *mascher.*
Askaȣanni, R. f. kaȣas; *mascher à quelqu'un.*

Asi, *pied,* S. Raosige, *à son pied.*
Osita v. Arasita, in comp. S.
Tȣarasitagarhaθon, *tourner le pied.*
Tȣasinnitagon, Ch. *avoir froid aux pieds;* ks, g, χe.
Tȣasinnitontagȣan, S. gȣas, go, gohe; *se geler les pieds.*
Tȣasiteñon, *avoir les pieds engourdis.*
Tȣatsinniagon, S.

Askaȣe, *aller pieds nuds*, s. Gainaskaȣe, idem.
Gariskaȣe, *aller sans bas*, s.

Askannegon, Ch. ks, g, kseg, χe; *desirer quelque chose.*
Askannegon, R. *desirer de bonheur d'un autre.*

Askati, *d'un costé.* Skannatati, *de l'autre costé.*

Askȣa, *eschaffaut.*
Askȣage, *sur l'eschaffaut; θ*o si etȣaskȣah-re, *la où est l'eschaffaut.*
Askȣaȣeron, R. *le vuider, renvoyer le prisonier.*

Askȣannonte, *l'avant d'une cabane.*

Tȣaskȣaseron, *marcher dessus;* Ch. rons, re, ronne.
Tȣaskȣaserakȣan, R. kȣa, kȣe, kȣanne.

Askôton. Ch. θa, t, tanne; *avoir, faire des trappes au castor, ours,* &c.
Hondatskotonnon, *ils sont allés faire des trappes.*
Askȣentannon, *tendre des colets.*

Asneragon, *blesser sans dessein, par mégarde.*

Asnenton, Ch. *descendre;* θa, t, tanne.

Asȣan, *s'esteindre le feu;* sȣas, sȣa, sȣasere.
Asȣan, neut. acq. *le feu s'esteindre à quelq.*
Ongȣasȣa, *mon feu s'esteint.*
Asȣaton, Ch. θa, t, tanne; *l'esteindre.*
Asȣatanni, *l'esteindre à quelq.*
Asȣennonnianni, R. *f.* nien; *donner à fumer à quelq.*
Osȣen, *charbon.* Osȣenta, *noir.*

Asohon, Ch. sohos, soho, sohose; *teindre.*
Asohoton, Ch. *teindre avec quelque chose.*
Asohot, *racine rouge qui teint en escarlatte que les Agniers nomment* Onnonkȣat.

Ason, *encore.* Asonsi giatase, *quand j'etais encore jeune.*

Asonnionkon, Ch. *pr.* et *f.* kȣa, *n.* kȣanne; *estre deffendu.*
Naie ȣasonnionkȣa, *cela est defendu*; est etiam 2ae conj. et frequentius.
Asonnionkon, neut. acq. Naie ongsonnionkȣe, *cela m'est deffendu.*
Asonnionkon, *avoir ses mois.*
Asonnionkȣanni, R. *f.* kȣen.

Asonratsi, *gros canard.*

Asonta, *nuit.* Asontes, *longue nuit.* Kenniȣasontesa, *courte nuit.*
Asonθenna, *pendant la nuit*, v. Asontage.
Asonθen, *minuit.* Kenȣasonte, *cette nuit.*
Oia tsi tiogaras, *la nuit d'avant hier.*
Tȣasontison, Ch. *estre nuit close.*
Asontagȣan, *passer la nuit*, s.
Asontanniron, S. *avoir peine à passer la nuit.*
Asontongoton, *passer la nuit*, ch.
Asontonni, S. *marquer tant de nuits.*
Asontenhaȣi, Ch. *idem.*

Asontajenni, *idem*, R. *f.* enhas.
Tȣasontraon, Ch. terha, tren, tranne; *mettre bout à bout.*
Tȣasontranni, R. *f.* terhas.

Astaȣen, *tortue que le jongleur tient en main en chantant.*
Astaȣeñon, *chanter l'ayant en main;* ens, en, ensere.

Ostara, *goutte d'eau.*
Astaren, *pleurer;* Ch. rha, ren, ranne.
Astaron, *de multis flentibus.*
Astarha^c^kon, Ch. *pleurer pour quelque chose.*
Astarontion, Ch. ties, ti, tiese; *pleuvoir.*

Aste, *dehors.* Asteon, S. tes, teg; *estre à sec.*
Astese, neut. acq. Onne tsiondastese tsonnito, *les castors sont à sec.*

Astenniaron, R. rons, ron, ronne; *donner du courage.*
Astenniaron, neut. Ch. *s'encourager.*

Ostenra, *rocher.* Ostenrio, *beau rocher.*
Osten^c^rionni, *point du rocher qui advance.*
Ostenragȣarionni, *lieu de pesche des Onneionts.*
Si etiostenrahre, *village des Agniers.*
Osten^c^ragȣentare, *rocher plat.*

Asteriston, Ch. *garder, se soucier, avoir soin;* θa, t, tanne.
Tagȣasterist, *aye soin de nous,* est etiam 2ae conj.
ȣaksterast, tsinni, raiatsten; *je considere, fais cas, aye egard à sa façon d'agir.*
Iosterest, *chose belle, agreable, pretieuse à la veue.*
Asterista^c^kon, Ch. *se mettre en peine de quelque chose pour raison.*

Asti, S. *estre pris au gozier d'une areste.*
Ongȣasti, *je suis pris au gozier.*
Astigahon, Ch. ȣas, ȣa; *passer souvent par un même lieu.*
Tȣastigon, Ch. gons, g; *vomir.*
Tȣastigaton, *provoquer à vomir,* est etiam R.

Aston, Ch. θa, st, stanne; *se servir.*
Θennon esastanne? *A quoi t'en veux tu servir?*

Astoron, *viste,* Ch.; melius Gasnoron.

At, *il y a dedans quelque chose;* jȣat, *imp.* jȣatakȣe, *f.* eȣatak.
Iȣatarion, *il y a quantité de choses;* vel Itȣat, ab Atarion. inde
Atariongȣan, Ch. *tirer dedans quantité de choses.*
Iaten te sȣat, *il ny a plus rien dedans.*
Gaiatate, *chose vivante être dedans.*
Ata, *mettre dedans;* tas v. ta, taanne, *enterrer.*
Atase, R. Tageθas, *mets moi cela dedans.*
Garihȣatare, R. *mettre l'affaire dans quelqu'un.*
Atrihȣata, neut. acq. *se mettre l'affaire.*
ȣagatrihȣataθe, *je vais escoutter.*
Gaiatata, R. *enterrer quelqu'un.*
Atiatata, Ch. *se mettre dedans quelque chose.*
Atiatataani, R. *se mettre dans quelqu'un; f.* tas.

Atakon, *ce dans quoy il y a*, in comp.
Gan^enegatakon, *où l'on met de l'eau.*
Gataksan, Ch. *tirer de dedans;* ksas, ko, kohe.
Gataksanni, R. *f.* ksas.
Gataksaton, *tirer de dedans avec quelque chose.*

Ata, *soulier*, extra comp.; Ataksa, in comp. Te jotarion.
Ata, R. *mettre les souliers à quelqu'un.*
sagoñjata, *que je te met les souliers.*
sagoñjata^ckon, *je te donne des souliers.*

Ata, extra comp.; Atatsera, in comp., *cheville, petit baton.*
Atatserat, *il y a une cheville dedans.*
Atatserst, *y en avoir; f.* tak: quando autem significat active, *y en mettre* habet in *præsenti* θa, in *f.* ten, *n.* tanne.
Atatsershton, *y avoir plusieurs chevilles.*
Atatserstagsan, Ch. *l'oster;* gsas, go, gohe : vel
Atatserotsion, Ch. sions, si, sionha.

Onta, *nuit*, extra comp. *f.* tag.
Θo nonta rotention? *Combien y a-t-il de nuits qu'il est parti?*
Θo gati nesata ensrase? *En combien de nuits sera-t-il de retour?*

Ataon, S. tas, tanne, tasere; *estre rassassié.*
Jaten te rotas, *il ne se saoule point.*
Atastom, S. *se saouler de quelque chose;* θa, t, tanne.
Ataston, R. *saouler quelq.*

Atageronte, *quarré*, S. Gannatageronte, *village quarré.*

Atagariton, S. cum reit. *se porter mieux;* θa, te.

Atagsarision, *developper, dresser;* Ch. sions, si, sionhe.
Aontagsarisi sandigon^era, *aye l'esprit droit.*

Atagsan, *estre refusé;* S. gsas, go, gohe.
Gatagsentaron, Ch. *estre gisant;* 2^{ae} conj.

Atagsenton, S. *θ*as, t, tanne; *estre large.*
Gaionni ken niotagsente, *un colier de cette largeur.*
Atagsentenston, Act. ch. *eslargir.*

Atanniharon, Ch. rons, ron, ronne; *enfiler.*
Ganniharon, 2^{ae} conj. inusitat.
Atanniharono^e, R.
Atanniharongsan, Ch. *desenfiler.*
Atanniharongsanni, R. *f.* gsas.
Atanniharon^ckon, Ch. *p.* et *f.* ksa, ksanne; *enfiler avec quelque chose :* forté derivatur a Gannihare, *jusques* aqh.

Atasa, Ch. *garder pour peu de tems.*
Atasase, R. Tagsatasas agosa, *garde moi ma robe.*

Atasen, Ch. ens, en, ensere; *se baigner :* forte ab Asen, *de l'eau.*
Atasensera, *bain.*
Atasenhon, Ch. *s'aller baigner.*
Atasenston, Ch. *θ*a, t, tanne; *se baigner, se laver avec quelque chose.*

Atasaȣen, Ch. cum notâ local., *commencer.*
Neθo tontasaȣen, *l'affaire a commencé par là.*
Atasaȣakon, *commencer par là.*

Otara, *argile, terre grasse.*
Ataragȣaronton, S. *terre elevée, bosse de terre.*
Ota^{c}ragȣara, *fezoles de terre.*

Ata, Atasera in comp., *petit escorce ou bois sec pour servir de flambeaux à la chasse des tourtes pendant la nuit.*
Ataseront, Ch. θa, ten, tanne; *chasser en cette façon.*
Ataserontanni, R. *f.* θas; *chasser pour quelqu'un.*
Ataserontannon, Ch. *y aller.*
Tagȣataserontanniha, *Va chasser pour moy.*

Atatsense, Ch. *imp.* schakȣe, *f.* seg, *n.* sere; *n'en pouvoir plus.*

Atati, Ch. tisk, ti, tianne; *parler.*
Atatiase, R. *parler à quelqu'un et pour quelqu'un.*
Atatiaton, Ch. θa, t, tanne; *parler avec quelque chose.*

Ategen, neut. S. *y avoir du feu;* χa, teg, tekse, teganne.
Iȣteχa, *il y a du feu;* ajoteg, *qu'il y ait du feu.*
Hoiatateχa, *il brusle;* hotiatategannon Jonhȣentsiagon, *ardent in inferis.*
Ategase, neut. acq. S. *ardere alicui.*
Ategaton, Ch. θa, t, tanne; *allumer du feu.*
Ategatanni, R. *f.* ten; *allumer du feu à quelqu'un.*
Ategata^{c}kon, Ch. *pr.* et *f.* kȣa, kȣanne; *allumer avec quelq. chose.*
Gannongȣategen, *cabane se bruler.*

Ategon, *diverses choses.* Jategon soña, *quantité de choses de diverse façon.*

Ategȣan, Ch. gȣas, go, gohe; *s'enfuir.*
Ategȣaton, R. θa, t, tanne; *donner la fuite à quelqu'un.*
Ategȣata^{c}kon, Ch. *chasser avec quelque chose.*
Ategȣasen *vel* Ategȣasenton, *lieu de fuitte; imp.* takȣe, *f.* tak.

Ateheñon, Ch. ens, en, ensere; *avoir honte.*
Atehaton, Ch. *être honteux pour quelque chose.*
Atehaton, R. θa, t, tanne, *hontoyer quelqu'un;* vel
Atehatanni, *f.* ten.
Atehase, neut. R. *estre honteux à cause de quelque chose.*
Iotehat, *celà est honteux.*
Atehensera, *honte.*
Atehenseragеȣen, Ch. *essuyer sa honte.*
Atehenseraratie, *aller estant honteux.*
Aongȣatehenseragasteg, *je serai bien effronté.*

Atehȣaon, cum reit. ȣas, ȣa, ȣasere; *guerir.*

Atehȣat, Ch. θa, ten, tanne; *garder, mettre en reserve.*
Atehȣatanni, R. *f.* θas; *garder à quelqu'un.*

Atekȣagȣan, Ch. *enlever un morceau;* gȣas, go, gohe.
Atekȣison, Ch. sas, sa, saanne; *manger tout.*

Atennaton, Ch. θa, t, tanne; *prendre pour provisions.*
Atennatsera, S. *provision :* Raotennatsera hondat.
Atennatseronni, Ch. nisk, ni, nianne; *faire des provisions.*
Atennatseronnianni, R. *f.* nien.
Atennatseratson, Ch. *consommer ses provisions.*
Atennatserokten, Ch. θa, ten; *estre à bout de ses provisions.*

Atengehȣen, R. hȣas, hȣa, hȣasere; *estre jaloux.*

Ateñjen, Ch. *p.* en, *f.* en, *n.* anne; *se chauffer.*
Ateñiase, R. *se chauffer chez quelqu'un.*

Atennraon, utriusq. parad. ons, on, onne; *estre fort, robuste.*
Atennraonston, R. *rendre quelq. fort;* θa, t, tanne.
Taktenneraonst Iesȣs, *Donne moy des forces, O Jesus!*

Atennȣsen, cum notâ dual. *être frère et sœur :* caret sing.

Atennienten, Ch. tens, ten, tensere; *marquer.*
Atennientenseron, multip.
Atennientenston, Ch. θa, t, tanne; *marquer avec quelque chose.*
Atennientensθa, *marque.*
Naie Iontennientensθa ne Jagorihȣioston Iaten te Jerihȣanderen, *On distingue les Chrétiens en ce qu'ils ne pechent point.*

Atennise, *baston sur lequel s'appuye;* S. Raotennhis *son.*
Atenniserenhaȣi, Ch. *aller avec un baston.*
Satenniserȣten, *appuye-toi sur son baston.*

Atennohȣajen, Ch. ens, en, ensere; *se baisser de peur de frapper.*

Atenᶜra, *palissade.*
Atenrȣt, *y avoir palissade;* takȣe, tak, utriusq. parad. dicunt enim Hondatenhrȣt, *ils ont palissade;* Sȣatenᶜrati, *hors la palissade.*
ȣatenᶜrannoron, *palissade forte.*
ȣatenᶜratsannit, Onneia.
Atenrȣtakon,
Atenrienneñon, Ch. *palissade tomber.*
Atenrogaton, Ch. *entrer dans la palissade.*
Atenronni, Ch. *en faire une.* Atenronnianni, R.
Atenraȣeraton, Ch. *passer pas dessus.*
Atenrion, Ch. *entrer dedans;* rion, rio, rionne.
ȣaontenᶜrio, *on entre dans la palissade.*
Atenrionse, R. *f.* rions; *entrer dans la palissade par.*
Eθo si etȣatenᶜragarent, *à la porte de la palissade.*
Tagȣatenᶜrionnsenniha, *venez nous secourir.*

Ateȣasaron, S. *pendant d'oreilles.*
Ateȣasaront, *en mettre;* Ch. θa, ten, tanne.
Ateȣasarontanni, R. *f.* θas.

Ateȣaton, cum reiter. Ch. *manquer son coup;* θa, t, tanne. Il se dit de toute sorte d'occasion qu'on a perdue, aussi bien que d'un mechant tireur. Sȣàtrihȣateȣaton, Ch.

Ateȣiat, *brasse.* Sȣateȣiat, *une brasse;* te ȣateȣiage, 2 *brasses.*
Tȣateȣiaren, Ch. *brasser;* v. Tȣatnensaren.

Ateȣejennonni, S. *faire avec addresse.*
Ateȣejennonnianni, R. *f.* nien.

Ateȣejenton, Ch. tonsk, ton, tonne; *garder, faire bien.*
Ateȣejentonni, R. *f.* has.
Tagȣateȣejentonhas, *fais moy bien cela, garde moy cela.*

Atention, *partir;* Ch. ties, ti, tionhe.
Atentiaton, *partir pour quelque chose,* Ch.
Atentiaton, R. *faire partir;* θa, t, tanne.
Atentiase, R. acq. *partir pour quelqu'un.*

Atentonni, *estre anneanti;* Ch. tonnisk, ni, nianne.
Jotentonni go, *il n'y a personne dans la cabane ou au village, grande silence et solitude.*
Ronneron hatigaionton Jaten teȣatentonnianne ongȣarihȣa, *Les ancestres ont voulu que leur affaire ne se perdit pas.*
Atentonniaton, R. θa, t, tanne; *faire partir.*
ȣasongȣatentonniat ronnontio, N. *nous a anneantis, ruinés.*

Atentoriaton, Ch. θa, t, tanne; *se desennuyer, divertir.*
Atentoriataᶜkon, Ch. kȣa, kȣag, kȣanne; *se desennuyer avec q. c.*

Tȣaterakiȣan, Ch. ȣas, ȣe, ȣasere; *se chausser, mettre ses mitasses.*
Tȣaterakiȣasion, Ch. *se les oster.*
Aterakiȣitsera, *mitasses ou autres nippes dont on se couvre les jambes.*

Aterannonte, S. *y avoir de l'espace, du jour entre deux choses qui ne sont bien jointes.*

Atenriennentons, Ch. *Convoquer les Agoianders de chaque bourg des Agniers dans un, pour tenir conseil.*

Aterasȣan, Ch. *rever en dormant;* sȣas, sȣa, sȣasere.
Aterasȣaton, Ch. *songer à quelque chose.*

Atera, *manne.*
Ateraȣiriens, aterȣannen, *grande manne.*
Ateronni, Ch. *en faire une.*
Ateronniaton, Ch. *bois dont on fait les mannes :* Onnonna.
Ateragete, S. *la porter.*

Aterhenton, Ch. θa, t, tanne; *muer, quitter son poil.*

Ateriaθa, Ch. *estre hardy, vaillant.*

Ateronkȣaronni, S. *estre rude, mal poli.*

Ateronkȣaton, Ch. θa, t, tanne; *employer mal, gater quelque chose.*
Ateronkȣatanni, R. *f.* ten; *gaster quelque chose à quelqu'un.*

Ateronni, S. *estre poltron.*
Ateroñon, S. rons, ron, ronsera; *avoir peur.*
Ateronton, S. *craindre pour quelque chose.*
Aterontanni, *f.* ten; *faire peur à quelq.*
Ateronse, R. acq. *craindre pour quelqu'un.*
ȣateronge eȣaton, *il y a à craindre.*
Ateroñon, S. *estre faché;* rons, ron, ronsere.
ȣagateronse, *je suis faché.*

Atetseñon, S. ens, en, ensere; *estre effrayé en dormant.*
Ongȣatetsen, *j'ai eu un mauvais songe.*
Atetsatanni, R. *f.* ten; *causer un mauvais songe à quelqu'un.*

Ateχonni, utriusq. parad. nisk, ni, nianne; *manger quelque chose de bon.*
Ateχonniaton, Ch. forte a Gakȣa, *morceau;* in comp. Gakȣio, *bon morceau.*

Atenro, *estre camarade,* Ch.
Agiatenro, tiatenro, tsiat, hiat.
Atenrotsera, *camaradise.*
Atenrotseragateñon, S. *avoir beaucoup d'amis.*
Atenrosen, *avoir un camarade;* R. takȣe, tag.

Ateton, in comp. *fort.*
Gaiatatéton, S. *homme laborieux.*
Jonnaȣatet, *rapide courant.* Ojengȣatet, *petun fort.*

Atkaon, *cesser;* Ch. ȣas, ȣe, ȣasere.
Atkaon, pass. cum reit. Ch. *se desdire.*
Atkaȣanni, R. *f.* ȣas.

Atkarion, Ch. rions, rion, rionne; *aller viste.*
Ratkariontie, *il va viste.*

Atkariseronni, Ch. *jouer, se divertir comme font les enfants.*
Atkariseronniaton, Ch. θa, t, tanne.

Atkatokȣisaon, Ch. as, sa, sanne; *pescher avec un pannier.*

Atkaθon, Ch. θos, θo, θosere; *regarder:* est etiam R. Tagȣatkaθo, *respice me.*
Atatkaθon, *se regarder,* Ch.
Atkaθóton, *regarder avec quelque chose.*
Jontatkaθota, *un miroir.*

Atkennaton, Ch. θa, t, tanne; *avoir fait coup.*
Jagotkennatonhatie, *on va ayant fait coup, victorieux.*
Atkennatatsera, *victoire,* S.
Raotkennatatsera,

Atkennison, Ch. sas, sa, saanne; *estre assemblé.*
Atkennisáton, Ch. *s'assembler pour ou par quelque chose.*

Atkeñon, S. ens, en, ensere; *estre pourry.*
Onnataratken, *pain pourry.*
Atkense, neut. acq. S. *se pourrir à quelqu'un.*
Otkenseri, extra comp. *pourriture.*
Onnitkenseri, in comp.
Jonnitkenseronni, *il s'est formé de la pourriture.*
Atkenserinnigeñon, S. ens, en, ensere; *pourriture sortir.*

Atkenȣaton, Ch. θa, t, tanne; *gouster.*

Atkenráton, Ch. θas, t, tanne; *cesser:* Onneiȣt.
Atkenratanni, R. *f.* ten.

Atkerȣθie, *peigne.* Atkerȣθion, Ch. *se peigner.* Gakerȣθionse, R.

Atkeᶜtaton, Ch. ts, t, taθe; *porter.*
Atkeᶜtati, R. *f.* ts; *porter pour quelq.*

Atkȣente, S. *estre mattachié.*

Atkȣenteeston, Ch. *se mattachier avec quelque chose.*

Atkon, *demon*, S. Il se dit aussi d'un homme hardy, &c. à qui rien n'est difficile.

Hondatkon nahontrio ganniegeronnon, *Les Agniers sont des demons en guerre.*

Hotkon rotatonni, *il est devenu demon, intrepide.*

Ati, *costé.* Skati, *d'un côté.* Kennongati, *de ce côté là.*

Skannátati, *d'un costé du village.*

Skiatarati, *un costé de la beste.*

Skannaatagarati, *un seul plat costé.*

Atkonskenniaton, Ch. *faire signe avec la teste;* θa, t, tanne.

Atkonskenniatanni, R. *f.* ten.

Atianneron, S. *avoir des visions, estre effrayé*; rons, ron, ronne.

Atianneronkon, S. *p.* et *f.* kȣa, *ce qui cause ces frayers.*

Atianneronkȣanni, R. *f.* kȣen.

Ataȣanre, Impson. rek, reg : *Cela ne peut pas entrer*, v. g. *par la porte ou ailleurs; cela est deffendu.*

Atraȣenre, neutre S.

Ongȣatiaȣenre, *Nous n'osons faire celà, de peur que quelque malheur n'arrive.* Dicunt potius Ongȣasonnionkȣe.

Atiaȣenraton, Ch. rats, rat, raθe; *defendre.*

Otiarenta, *fleur de citrouille.*

Otiarenta niot, otiarentage nigoserȣten, *couverte, étoffe jaune.*

Atiarentiaχon, Ch. χes, χo; *aller cueiller de fleurs de citrouille.*

Atiarentiaχonse, R.

Atiatagetaton, R. ts, t, θa; *renverser, jetter par terre.*

Atiatennion, de Gatennion, 2 C. *se changer*; nions, tenni, nionha.

Onneia eȣatiatenni gannatarok eȣaton, *lapides mutabuntur in panem.*

Atiaktanni, neut. S. *f.* ten; *estre arreté.*

Ongȣatiakten, *je suis arretté.*

Gaiaktanni, S. *idem.*

Atiaktanni, R. *arrester, retarder quelqu'un.*

Naie jongȣatiaktanni nyoθore, *le froid nous a retardés.*

Atiataȣit, S. *capot.* Raotiataȣit, *son capot.*

Atiataȣiton, S. θa, t, *avoir son capot* est etiam R.

Atiataȣitasion, S. *l'oster*, sion, si, sionhe.

Tȣatierenton, cum notâ local. θa, t, *le* 1er *commencer.*

Igi eskatierent, *je commencerai le premier.*

Etiotierenton v. tontierent, *ab initio.*

Atiarentakon, Ch. *p.* & *f.* kȣa, kȣanne.

Atient, Ch. ensk, en, enne; *s'asseoir.*

Atienni, R. *f.* enhas.

Atientakon, Ch. *p.* & *f.* kȣa; *s'asseoir là.*

Otienni, *quelque chose qui repond beaucoup.*
Ajotiennik ostarokȣa okti agȣegon aχeiaȣiseg : *Il faudrait que la rassade repondit beaucoup pour que j'en donnasse à tous.*
Jotenni ohiegaront : *Il faut peu de saumon pour assaisonnement, il repond beaucoup.*
Jotennisoten, *ce qui repond peu.*

Atiesen, *liberal*, S. Aontiesenha onnonkȣat, *Comme si l'on devoit prodiguer les médecines.*

Atihen, cum notâ local.: 2 *choses inégalement mises, comme ces deux lignes* ——, *l'une deborde plus que l'autre.*
Te giaθihen, 2 *choses inégales.*

Atihenton, Ch. cum notâ local. θos, θo, θosere; *tirer par force.*
Atihenton, R. Gaiatatihenton, R.

Atio, sing. *no.* caret : *estre beau-frère.*
Agiatio, tiatio, tsiatio, hiatio.

Ation, S. ties, ti, tiese; in comp. ontion, *jetter.*
Sati, *jette cela.* Ogont ȣagoti, *jetter, laisser pour moy.*
Atiense, R. *f.* tiens; *jetter à quelqu'un.*
Tagȣatiens, *jette moy cela.*
Atieton, S. θa, t, tanne; *jetter en arrière.*

Ontion, in comp. Gaiatontion, R. *abandonner q.*
Gaiatontieton, *abandonner entièrement quelqu'un.*
Garihontion, *jetter l'affaire*, S.
Garihontiense, R. Jontatrihontiens te jagoȣennaraon.

Atiogont, v. tiôtkont, *toujours.*

Atiȣen, S. ens, en, ensere; *estre maigre.*
Atiȣaon, S. θas, θa, θasere; *le devenir.*
Atiȣaton, Ch. *s'amaigrer pour quelque chose.*

Atiront, Ch. θa, ten, tanne; *attirer, tirer, allonger.*
Sennhohatironten, *tire la porte.*
Atiront, R. ȣahiatatironten, *il t'a attiré.*
Atirontanni, R. acq. *f.* θas.
Gatagȣatironθas, *tire moy celà.*

Atisaien, S. *tardif à croistre.*

Atisnore, S. *prompt à croire.*

Atiskȣentaron, R. ron, re, ronne; *se coucher sur le ventre.*
Gaiatiskȣentaron, R. *coucher.* Tȣatoren, *se moderer.*

Atenneha, *du plantin.*

Atnenha, *noyau.*
Tȣatnenhaȣinneton, Ch. θa, t, tanne : *jouer avec des noyaux comme font les femmes, en les jettant avec la main.*
Tȣatennaȣeron, Ch. rons, ron, ronne : *y jouer au plat.*

Tonsaȣatógen, S. *se démarier*, ab Ogen, quod significat divisionem.
Te tsiongiatogen nondȣtagete, *j'ai quitté la guerre.*
Tonsaȣatogeston, Ch. θa, t, tanne: *se démarier pour quelque raison.*
Naie te tsiontogesθa jaten te jagonhȣioston, *on se démarie parceque on n'est pas heureux...*

Atogȣat, *cueillière.* Atogȣatsera, in comp.

Atohara, *bout de flèche pointu,* Huron. Tagȣatoharonnien.

Atsoθen (dicitur de pisce), θosk, θo, θosere : *sauter, se plonger.*
Tȣatsoθon, Ch. *le soleil se coucher.* V. infra.

Aton, *devenir, etre fait;* onk, on, onre. Eȣatonre v. Eȣatonsere.
Onhȣentsia señȣen aonton, *terra fiat.*
Nota quod verbum hoc concordat aliquando numero et genere cum substantivo, v. g. Jesȣs ongȣe rotoñon, *Jesus s'est fait homme.*
Aliquando non concordat quando nimirum sumitur impersonaliter, v. g. Ise satsihenstatsi eȣaton, *tu fies religiosus.* Otkon etȣaton netsitȣatonnhet, *vel* ongȣatkon eȣaton nïentsitȣatonnhet; *nous deviendrons esprits quand nous resusciterons.*

Ation, impersonalitur jungitur verbis quorum finalis non inflectitur. Ita seȣendio eȣaton, aonton, ajotonong.

Aton, *estre possible.*
Eȣaton ken asaᶜtenti, *possibile ne erit proficiscaris.* Aonton gatigen; *quasi vero possibile foret.*

Atonse, neutr. acq. S. *devenir à quelqu'un.*
Aȣen ongȣtons nagatkaston, *la sagamité que je fais devient de l'eau.*
Atonse, neutr. acq. S. *possibile esse alicui.*
Jaten te ȣagatonse, *non mihi est possibile.*

Atoñon, cum reit. Ch. *guerir; p. & f.* ton, n, tonne.
Onne onsagaton, *je suis gueri.*
Aonsaiontonon gaionᵉnegiren onnonkȣat, *elle eut été guerie si elle eut pris médecine.*

Aton, *apparaitre en figure.*
Onniare jotonhatienn notkon, *le démon prit la figure d'un serpent.*
Atonni, R. in comp. cum Garata, passivi vocis.
Songȣatiatatonni, *il nous est apparu.*

Atoon, impers. S. *y avoir beaucoup de productions de la terre.*
Jotoon aȣenhagenrat, *il y a beaucoup de chataignes.*
Taonχen jotoon ne gontisk okȣari! *O qu'il y a bien de ce que les ours mangent!*

Atonton, Ch. θa, t, tanne; *faire le tantieme,* jungitur numeris ordinalibus.
Ise gaieri nesatont, *tu seras le* 4ᵉᵐᵉ.
Gaieri aesatontong, *tu fuisses* 4ᵘˢ.
I. ȣisk gatonθa, *je suis le* 5ᵉᵐᵉ.

Tȣatonton, Ch. *se mettre deux au même plat ou à faire même chose.*
Te tsiatont nhetsegeña netsiatsori, *manges ensemble toy et ton cadet.*
Tȣatontonse, R. acq. *se mettre 2 ou 3 pour ou contre quelqu'un.*
ȣaθoñatontons ahoñario, *ils se mirent 2 pour le battre.*
Atonton, sine te dual. *se mettre plusieurs pour faire une même chose.*
Gaieri natsiatonte, *soyes 4 ensemble.*
Ojeri nahontonte, *ils se mirent dix.*

Aton, Ch. θa, t, tanne; *se servir.*
Θennen ensat? *A quoy t'en serviras tu?*
Ason gaθa, *je m'en sers encore.* Ontagaton.

Tȣaton, S. impers. *estre de manque.*
Niahoθennon te tioᶜton garonhiage, *il ne manque de rien au ciel.*
Etȣágaton, *j'y manque.* N. joton, *N. y manque.*
Ontagaiatаton, *la lune manquer.*
Tegni tetkaiatаton, *d'icy à deux mois.*

Atoñon, Ch. *se perdre, s'egarer q. ch.;* tonk, ton, tonne.
Niahoθennon te ȣatonk si etiongȣannonsȣte, *rien ne se perd dans notre maison.*
Onne agarihȣaton, *voilà l'affaire perdue.*
Atoñon, *se perdre, s'égarer* (de re vivente).
Asiatаton v. Saiatаton, *tu t'es trompé, égaré.*
Atonni, neutr. S. tonnisk, ton, tonnire; *estre perdu à quelqu'un.*
Agatonni v. Ongȣaton, *hoc mihi periit.*
Agiatatonni v. Ongiatаton nagetsennen enhas, *j'ai perdu mon chien.*
Atonᶜton, θa, t, t, tanne; *faire perdre, égarer.*
Horihȣaᶜtonton, *il a fait perdre cette chose.*
ȣahagiatatont, *il m'a deceu, fait perdre.*
Atiatatontȣn, *s'évader.*
Atontanni, R. acq. *perdre à quelqu'un.*
ȣahagȣaᶜtonten, *il m'a perdu quelque chose.*
ȣahagrihȣatonten, *il m'a esgaré mon livre.*
Atatontanni, neutr. acq.
Asongȣatiatatonten, *il s'est enfuy de nous.*

Atoñaronnion, Ch. ni, nianne; *estre ruiné de fonds en comble, ne rien rester.*
Jatonaronnion nȣagientakȣe, *tout ce que j'avais est perdu.*
Atoñaronniaton, Ch. *perdre, dissiper, gaster tout,* est etiam relativum.

Atonhȣajen, *se baisser, se tourner d'un autre costé.*
Tȣatonharenron, *estre en crainte pour quelque malheur advenir.* S.
Tȣatonharenronᶜkon, S. *estre en crainte pour quelque chose.*

Atonkariagon, Ch. *avoir faim;* ks, g, χe.
Atonkariakton, Ch. *ce qui cause la faim;* est etiam rel.

Tȣatonnhakarien, Ch. riaste, ri, rihe; *estre misérable, souffrir beaucoup.* Vide Gagarien.
Tȣatonnhakariakton, Ch. *estre malheureux pour q. c.,* est etiam rel.
Tenskȣatonnhakariakte, *tu nous rends misérables.*

Otonkȣa, *flamme, fièvre.*
Gatonkȣarhoon, S. hos, ho, hosere; *avoir la fiévre.*
Gatonkȣarhoston, S. *causer la fièvre.*
Atetonkȣaragȣan, Ch. *la chaleur de la fièvre s'en aller.*
Te gatonkȣare, Ch. *avoir grand chaud.*
Atetonkogȣan, *la flamme s'eslever.*

Atonnhien, Ch. nhiha, nhie, nianne; *nier, s'excuser.*
Atonnhianni, R. acq. *f.* nhien.
Eskȣatonnhien, *tu mihi vel pro me negabis.*

Atonrion, Ch. ries, ri, riese; *respirer.* V. aonria, *halitus.*
Atonrieθon, Ch. θa, t, tanne; *respirer par quelque chose.*
Atonriajen, *faire le hé hé au chant des guerriers.*
Atonriajenni, R. *f.* enhas; *le faire pour quelq.*
Atonriokte, Ch. θa, ten, tanne; *perdre haleine.*
Atonrianneron, Ch. ons, on, onre.
Atonrianneronkon, Ch. kȣa.

Atonriaron, Ch. rons, ron, ronne; *médiciner.* Est etiam rel.
Atonriaronkon, Ch. *médiciner avec q. c.*

Atonranni, R. *f.*, *rien remercier.*
Atonraseron, Ch. rons, ron, ronne, est etiam rel.
Atonraseronkon, *remercier par q. ch.; p.* & *f.* kȣa, kȣanne.

Atonriateᶜton, Ch. θa, t; *un chien gronder.*

Atonnotsion, Ch. *laver la gale.*

Atonȣaraien, Ch. *s'abbaïsser de peur de heurter.*
Tȣatonȣesaon, Ch. sas; *danse des femmes.*

Atonrohon, Ch. ros, rohȣe, rohese; *plonger.*
Atenrohose, R. *f.* ros; *plonger pour honorer, saluer quelqu'un.*

Atonront, Ch. θa, ten, tanne; *chanter un air auquel on repond par des hen hen.* Satonronten, *chante.*
Atonrontakon, Ch. kȣa, kȣag, kȣanne; *chanter pour cause.*
Atonrontanni, R. *f.* θas; *canere alicui.*
Tȣatontarikton, Ch. θas, t, tanne; *faire huée* est etiam R.

Atontarion, *les varangues du canot.*

Atoon, S. tos, to, tosere; *vouloir, consentir.* Atose, R. *f.* tos.

Atȣagannen, Ch. nha; *parler une langue étrangère.*
Atȣagannhannion, multip.
Atȣagannhase, R. *parler à quelq. un langue differente.*

Atȣannha, S. *brasselet.*
Atȣannhen, S. nha, nhag; *en avoir, en mettre.*
Atȣannhaston, S. *en faire de q. chose.*

Atȣendȣtakȣaton, R. θa, θ, tanne; *demander q. chose à quelqu'un, s'en prier.*

Atȣeston, Ch. θa, t, tanne; *passer.*
Atȣestanni, R. *f.* ten; *passer quelqu'un.*
Atȣestakon, Ch. *p.* & *f.* kȣa, *n.* kȣanne; *le lieu par où l'on passe.*

Tȣaȣeston, *percer.* ȣationȣest, *on perce.*
Tȣaȣestaᵉkon, Ch. *percer par quelque chose.*

Atȣekon, S. *estre affable.*

Atȣenteton, Ch. *abandonner quelque chose;* θa, t, θe. Est etiam relat.
ȣahoñatȣentat, *on l'a abandonné.*

Atori, Ch. *chasser des bestes.*
Atorianni, R. *chasser à quelq. ou pour quelq.*

Ti geθa, Si seθa, &c. *je fais à dessein.*
Te ȣageθon, S. taget, taset, taret.

Aθo, S. *froid* a quo, Joθore, *il fait froid;* rekȣe, reg.

Aθoraton, Ch. rats, rat, raθe; *faire froid.*

Jaten te ȣaθorats garonhiage, *il ne fait pas froid au ciel.*

Nota quod quando significatur actus utendum est impersonale parad. S., v. g.: Joθore, *il fait froid.* Ejoθoreg, *il fera froid.*

Si vero significatur habitus utendum, impers. parad. Ch., v. g.:

ȣaθorats te giatontarigon, *il fait froid à Kebec.*

ȣaθoratskȣa eȣaθorat jaten te eȣaθoraθe.

Aθoraton, neut. S. *avoir froid.*

ȣagaθorats, *j'ay eu froid.* ȣesaθorat, *tu as eu froid.*

Aθoraston, *causer le froid.* Ch.

Naie ȣaθorasθa, *voilà ce qui fait le froid.*

Aθoge, *le nord, du costé du froid.*

Aθoraton, Ch. ts, t, taθe; *chasser.*

Aθoraθon, *y aller.*

Aθorati, R. *chasser pour quelqu'un.*

Aθontaton, Ch. *entendre, obeir;* ts, t, θe.

Aθontati, R. *obeir à quelqu'un; f.* tats.

Aθontasθa, Ch. *ce qui fait obeir.*

Aθonte, S. *approuver, consentir;* te, teg, tekse.

Aθotaton, Ch. *se reposer, cesser d'agir;* ts, t, θe.

Jaten te gaθotats tsinni ȣagióte, *je ne me repose point tant je suis occupé.*

Aθote, S. *demeurer en repos, ne dire plus mot.*

Stotek, *tais toy.* Gatsiaθoteg, *taisez-vous, vous 3 ou 4, &c.*

Tȣatotsinneᶜton, Ch. θa, t, tanne; *glisser sur la glace.*

Tȣatotsinnetakon, *glisser en un lieu marqué.*

Te jontotsinnetakȣa, *écorche ou planche sur laquelle on glisse.*

Tȣarennion, Ch. nies, ni; *eloigner, écarter.*

Tȣarenniaton, Ch. est etiam rel.

Atratitsera, *fourrure de souliers.*

Tagȣatratitserageñas, *fais moi de la paille pour garnir mes souliers.*

Atratitserata, *mettre des fourrures.*

Atratitserat, *y en avoir.*

Atrea, *avoir pour petit fils ou petite fille.*

Hiatrea, *c'est mon petit fils.* χeiatrea, *c'est ma p. f.*

In voc. kȣatri, *o mon petit fils; o ma petite fille.*

Kȣatre ogon, *o vous mes petits fils.*

Atresera, in comp.

Atreseraien, S. *en avoir.*

Atren, S. trens, trenskȣe, tren, trensere; *faire festin.*

Metaphorice, N. Hotrenskȣe nondȣtagete, *N. est la chef de la guerre.*

Atrentandi, R. *f.* ten; *donner à quelqu'un de quoi faire festin.*

Atrenton, S. θa, t, tanni; *faire festin de quelque chose.*

Atren, S. *danse des anciens, chanter.*

Jagotrens, *on chante.*

Atrendȣt, Ch. θa, ten, tanne; *chanter.*

Atrentanni, R. *chanter pour quelqu'un.*

Atreon, S. ons, on, onne; *porter le deuil, estre veuf.*

Atri, *courroye de raquette.* S. extra comp.

Atriston, *en faire de q. c.* Atritsera in comp.

Atsia, extra comp. Atsianna, in comp. *le dedans de la main.* Te ȣatsiannage, 2 *jointées.*

Atsiagȣennonni, *serrer la main.*

Atsiagȣarision, *l'ouvrir.*

Atsiohare, Ch. re, reg; *laver ses mains.*

Atsiannont, S. *avoir quelque chose en la main.*

Θennon satsannontati, *que vas tu portant à la main?*

Atsagannen, Ch. nha, nhag; *parler une langue étrangère.*

Atsagannen, S. *estre étranger, d'une langue differente.*

Atsagannhannion, Ch. *parler diverses langues differentes.*

Atsagannhenta, in comp.

Ratsagannhentaksen, *le méchant parleur.*

Atsannhon, Ch. ons, on, onhe; *degoutter, l'eau tomber goutte à goutte.*

Atsennhonnion, Ch. *quantité de gouttières.*

Atsaȣendori, S. ri; *se divertir, se moquer.*

Atsaȣendorieton, Ch. *faire son divertissement, son jeu de quelque chose,* est etiam rel.

Atsarogȣan, Ch. gȣas, go, gohe; *bruit de plusieurs qui parlent.*

Atsaton, Ch. tons, ton, tonne; *faire une cache.*

Atsatonkon, Ch. *p.* et *f.* kȣa, n, kȣane; *lieu où l'on fait cache.*

Atsatonse, R. *faire une cache à quelqu'un.*

Atsatongȣan, Ch. gȣas, go, gohe; *la decouvrir.*

Atsatongȣanni, *la decouvrir.*

ȣaonχigaronni, onχiatsongȣanni, *on nous a fait grand tort, on nous a decovert une cache.*

Atesatongȣan, neut. Ch. *cache se decouvrir.*

Otsata, *brouillard.* Atsateñon, *tomber br.*

Josateñon nagendigonra, *j'ai l'esprit brouillé d'affliction.*

Atsatajenθon, S. *y avoir brouillard.*

Atsatageȣan, *le brouillard se dissiper.*

Atsat, *montrer;* saθa, saten, saθanne. Hetsatsaten, *montre le.*

Ise ȣahiat saten, *il l'a montré, indiqué.*

Atsatanni, R. *f.* θas; *montrer à quelq.*

Atseïaron, Ch. rons, ron, ronne; *estre timide, n'oser pas, perdre courage.*

Θosa tegatsejaron nagrihȣiost, *que je ne sois pas honteux d'être chrétien.*

Atseiaronse, R. *craindre, être honteux pour quelq.*

Atȣendatseiaron, Ch. *n'oser pas parler par crainte, par timidité.*

Atsenharen, S. *perdre un bon morceau pour ne se pas trouver, ou pour n'avoir rien tué.*

Atsennonnion, Ch. v. S. nisk, ni, nianne; *estre bien aisé, estre heureux.*
Atsennonniaton, Ch. *estre heureux pour q. chose*, est etiam rel.

Atseratéron, Ch. res, ren, rese; *estre possible.*
Atseratéron, neut. S. Jaten taongȣatseraterenn, *non possem.*

Atserhaton, R. θa, t, tanne; *poursuivre quelq.*

Atsi, *camarade.* Atsisera, in comp. Ongiatsi, *nos 2 sumus.*
Atsiserajen, S. *en avoir.*

Otsiera, *ongle*, S. Gatsierarágȣan, Ch. *arracher l'ongle.*
Gatsieraragȣanni, R. *f.* gȣas.

Otsiskȣa, *boule.* Tȣatsikȣaon, *crosser.*
Tȣatsikȣaeston, Ch. θa, θ.

Tȣatsigaȣeron, *nàger.* Ch.

Atsinnaton, Ch. tons, ton, tonne; *courir la nuit, faire mal, &c.*

Atsinnaχen, S. *jongleur.*

Atsinnha, *jartière.* Atsinnhaχon, g. *mettre ses jartières.*
Atsinnhaston, Ch. *avoir des jartières.*

Tȣatsinnaȣiagon vel **Tȣannojagon**, S. aks, ag, aχe; *être bossu.*

Atsiriaȣen, Ch. *estreindre, serrer.*

Tȣatsisonχon, Ch. *trembleterre.*

Otsigre, *nuée.* Jotsigre, *il y a de nuées.*
Ontajotsigrontie v. tagotsigratie, *le ciel s'obscurcit de nuées.*

Ontsa, *genou.* Tȣatonsȣt, Ch. θa, ten, tanne; *se mettre à genoux.*

Atsogȣan, Ch. gȣas, go, gohe; *petuner.*
Atsogȣanni, R. *f.* gȣas; *donner à petuner à quelqu'un.*
Atsogȣaton, Ch. *petuner avec quelque chose.*

Atsogȣannen, S. *riche.*

Atsonnion, *coucher le long du feu.*

Atsoθon, Ch. θosk, θo, θosere; *sauter dans l'eau, d'un poisson.*
Tȣatsoθon, Ch. *se mettre dans l'eau, y entrer.*
Significat etiam *le soleil se coucher, quasi immergat se.*
Tȣatsoθoθon, Ch. *la ou l'on se met dans l'eau.*
Te ȣatseθo nongati, *du coste du soleil couchant.*

Tȣateȣasoθon, Ch. θa, t, t, tanne; *faire le devin, entrer dans la suerie pour sçavoir le passé, present et advenir.*

Atsori, C. risk, ri, rianne; *manger de la sagamité.*
Atsoriaton, Ch. *le lieu ou le temps où on mange la sagamité.*

Atsotsion, Ch. sions, si; *se brusler la bouche.*

Tȣattetaron, neut. Ch. *s'entrouvrir;* ron, re, ronne.
Etȣatonhȣentsiattetare, *la terre s'entrouvrira.*
Attetarongȣan, *idem.*
Atterigȣan, Ch. cum notâ reit. et loc. *s'enfler.*
Attetanni, R. *f.* ten; *tancer, menacer.*

Attogen, *avoir de l'esprit;* Ch. χa, g, χag.

Ogrigon, in comp. *être retiré, refroigné.*
Tȣatkonsogrigon, S. *avoir la visage refroigné.*
Te ȣagenniogri, *j'ai les doits retirés.*
Atogrigon, S. pass. Jotogri raondigon^e^ra, *il a l'esprit retreci, retiré de douleur.*

Atȣekon, S. *p.* et *f.* ek, en, eχe; *estre affable.*
Agatȣek, satȣek, rotȣek, jotȣek. Garȣten, S. *idem.*

VERBA 2^ae^ CONJUGATIONIS.

Gaason, R. *donner un coup de couteau;* sons, son, sonne.
Atataason, neut. recip. *s'en donner soymême.*

Ogakȣenta, *Pois, sorte de farine un peu grosse.*

Gagaion, S. *estre laborieux.*
Gagaieñon, ense, en, ensere; *desirer de voir son pays.*
Atkaienton, *desirer en songe.* Ch.

Gagaion, impers. *estre vieux, usé.*
Gannatagaion, *vieux village.*
Gannonsagaion, *vieille cabane.*
Gagaionton, S. *les ancetres, anciens.*
Gagaiont, Ch. *estre indisposé.*
Ragaiontes, *il est indisposé.*

Gagáon, S. gas, gaȣe; *trouver bon :* inflectitur ut verba 3^ae^.
Garihȣagáon, Ch. *aimer l'affaire, trouver bonne.*

Kagannere, *voir,* Ch. est etiam rel.
Kaganneron vel Kaganneráon, S. nre, nranne; *voir en songe.*

Gagannenton, Ch. *lescher;* θa, t.
Snatsiagannent, *leche la chaudière.* Significat etiam *baiser quelqu'un, le caresser.*
Atatgannenton, Ch. *s'entresaluer.*

Gagannonnion, non est in usu sed inde composita.
Atkannonnion, Ch. *pr.* ni; *estre bon, beau, parfait.*
Jotkannion naondigonra, *il a l'esprit bien fait.*
Gaiatagannonnion, Ch. *estre bien fait de corps.*
Garihȣagannonnion, *bonne affaire.*

Gagaȣet, *aviron.* Agaȣetsera, in comp.
Gagaȣe, Ch. *manier l'aviron, ramer.*
Hatigaȣennontie, *ils vont ramant.*
Gagaȣetseragȣetaron, Ch. *en couper un.*

Gagaȣon, Ch. ȣas ou ȣasera; *dresser la sagamité.*
Gagaȣanni, R. *f.* geȣas.

Gagara, *fable.*
Gagaraton, Ch. tons, ton, tonne; *en dire.*
Gagaratonni, R. *f.* tonhàs.

Jogarate, *de cette hauteur.* K^e^n n'ahotakȣendiagarate, *il y a des meubles, un meuble de cette hauteur.*

Ogare, *escorce dont on se sert pour lier.*
Gagaron, Ch. *en lever.*
Gagaronhon, *en aller lever.*
Gagarotsion, *la detacher de la premiere peau.*
Gagariagon, Ch. *payer ses dettes;* ks, g, χe.
Gagariagi, R. acq. *payer pour quelqu'un.*
Gagarokte, Ch. *achever de tout payer.*
Gagariakton, Ch. θa, t, tanne; *payer avec q. c.*
Gagaroktanni, R. *donner à crędit; f.* θas.
Gagarȣt, S. *avoir, faire ses dettes.*
Gagarennion, Ch. nies, ni, niase; *eloigner*, est etiam rel.
Gagarenniaton, Ch. *eloigner par quelque chose.*
Gagarenron, S. *pancher d'un costé.*
Onne jogarenre, *il est après midi.*
Gannatsiagarenron, Ch. *chaudière qui penche d'un costé.*
Gagarenton, S. θa, t, tag; *estre percé.*
Jonhȣentsiagarent, *un trou en terre.*
Gagareȣaton, R. θa, t, tanne; *blesser quelqu'un, ou se blesser.* Est Parad. S.
ȣahogareȣat, *il s'est blessé.*
Significat etiam apud Onnejȣtos, *regretter un mort.*
N. raondigonra rogareȣat, *et en disant cela on jette la pourcelaine sur le corps.*
Significat etiam *estre la cause d'un mal arrivé.*
Θennon ȣahogareȣat, *quasi dicunt qui l'a blessé.*
Gagarhaθon, Ch. θosk, θo, θosere; *tourner, renverser.*
Onhȣentsiagarhaθon, *renverser la terre.*
Gagarhatennion, Ch. nions, ni, nionhe; *idem.*
Gaiatagarhatennion, *de re vivente.*
Atkarhatennion, *se tourner*, Ch.; ȣatkarhatennions, *une roue.*
Gandigonragarhaθon vel Gandigonragarhatennion, *renverser l'esprit à quelqu'un.*
Iogas agontak, *ma chaudiére coule.* V. ȣaoχa.
Gagarien, Ch. riask, ri, rihe; *manger, mordre.*
Gannatagarien, *manger un village*, est etiam R. Hoñagarien, *on l'a mangé.*
Gagariaton, S. *ce qui fait manger.*
Jogariat, *O qu'il mange ici à cause des puce*, etc.
Jogaratianne, *maringouins* (vel potius Jogariatanne).
Gagarien, neut. S. rogarias tsinnon, *il a des poux.*
Tȣaterientagarien, Ch. *estre misérablement tourmenté de l'esprit pour un mal present* ou *futur.*
Tȣaterientagariakton, R. *affliger quelq.*
Atkarien, in comp.
Tȣateriaskarien, Ch. *estre pauvre.*
Tȣatonnhakarien, Ch. *souffrir beaucoup.* Fiunt relativa uti supra.
Atatkarien, Ch. *s'entremanger.*
Gagarihaton, R. *manger beaucoup.* v. g. *d'esclaves.*

Gagaronnion, R. nisk, ni; *faire tort à quelqu'un, lui causer quelque perte.*
Atkaronnion, Ch. *faire quelque perte.*
ȣaonχigaronni, *on vous a fait un grand deplaisir.*
Gagaroon, Ch. rosk, ro, rosere; *carder du chanvre.*
Ogarȣsta, *boyaux.* Agarȣstagon, *dans les boyaux.*
Gagasera, *larme.* Gagatsia, *idem* in comp.
Gagasereñon, S. *des larmes tomber.*
Gagaserariron, Ch. *en repandre.*
Kagaseragèȣen, Ch. *les essuyer.*
Kagaseragèȣenni, P. *f.* eȣas.
Kagasiagenton, *repandre des larmes.* Ch.
Te sagakente, *tu as des marques d'avoir pleuré.*
Gagasaien, S. *estre lent à marcher.* Gagasaiaton.
Gagasaiatanni, R. *f.* ten; *retarder quelqu'un par sa lenteur.*
Gagaste, Ch. *aimer beaucoup;* takȣe, tak.
Kgasθa nondȣtagete, *j'aime beaucoup la guerre.*
In comp. Gannegagasθa, Ch. *aimer à boire.*
Gagatste, impers. Ch. *fort, dur.*
Onnhegatste, *vie dure, longue.* Gaiatagatste.
Gasiragatste, *étoffe forte.*
Atkatste, *estre patient à endurer.* S.
Gandigonkatste, *esprit fort.*
Atatkatste, S. *se fortifier pour endurer.*
Ataskatste, S. *être heureux, à son aise, ne manquer de rien.*
Gagaston, R. *faire sagamité à quelq.;* tons, ton, tonne.
Atkaston, Ch. *faire sagamité.*
Atkastongȣan, Ch. *l'avoir faitte.*
Atkastonkon, Ch. *la faire de q. c.;* kȣa, kȣag, kȣanne.
Gagateñon, S. *avoir abondance de q. c.* Sæpius in comp.
Gentsiagateñon, *avoir abondance de poisson.* S. te, teg, tensere.
Gagatenston, *en avoir abondance pour ou par q. c.*
Gagatenni, R. *f.* ten; *faire avoir abondance à quelq.*
Garihȣagateñon, S. *estre babillard, grand parleur.*
Garihȣagatanni, R. *f.* ten; *parler, dire beaucoup de choses à quelq.*
Atkate, *être beaucoup de monde.* S.
Jagokate ongȣe, *quantité de monde.*
Oga^cte, *cru.* Osaragate, *chair crue.*
Ogate, *œil*, extra comp. Kgatake, *à mes yeux;* sgate, ragate.
In comp. Okara.
Gakarīo, *beaux, bons yeux.*
Kaga^crogaton, *pocher l'œil.*
Gakarohason, act. r.
Atkaroheson, *se borgner.* P.
Kakarotagȣan, *arracher l'œil.*
Kakarannoñagon vel Kakarahiagon, S. *avoir mal aux yeux.*
Kagakarenron, S. *estre louche.*

Ti agotkakaratihen, *on est louche.*
Tȣatkataȣeñjon, S. *estre borgne.*
Gagarateton, S. *avoir l'œil perçant.*
Kagakȣarision, Ch. *ouvrir les yeux.*
Kagakennion, R. nies, ni; *decouvrir l'ennemi sans en être vu.*

Kagaton, S. *aller viste, estre bon marcheur;* θa, t, tanne.

Gagatotsienton, Ch. θa, t, tanne; *pescher en puisant le poisson comme font les Agniers le haran.*

Gagen *ou* Gageña, *avoir pour cadet.*
Higeña, *mon cadet;* χegeña, *ma cadette.*
Hetsigeña, *ton,* rogeña, *son,* agogeña, *sa cadette.*

Gagen, *voir*, Ch. ensk, en, ensere.
Gagen, R. ȣahoñagen, *on l'a vu.*
Gȣannonsagen, *on a vu une cabane.*
Significat etiam de visu in somnis, v. g.:
ȣahagen rotsinnaχen, *le jongleur a vu.*
Atken, Ch. est etiam R. Goñjatkensere, *je te viens voir.*
Atkensennion, Ch. *voir de tous cotés.*
Atkenseron, *aller à la decouverte.*
Atatken, *s'entrevoir;* kens, ken, kensere.

Atken, *se lever sur son séant.* Satkenχio, *leve toi.*

Ogenha, *couverte.* Gagenhaksen, *mechante couv.*

Gagenia, *cheveux qui tombent sur le front, extremité.*
Gagenhiagon, *les couper*, Ch. Gagenhiagi, R.
Tȣatgenhogen, *avoir les chevaux sur le front divisés, d'où ils ont nommé les femmes;* te hondatkentiogen.

Gagenhiat, *bout, extremité de quelque chose.*
Gannontagenhiat, *a bout de la montagne.*
Gannonskenjat, *pro* Gannonsagenhiat.

Gagengȣara, *front.* Jegengȣaren, *au milieu du front.*
K'kengȣarakske, *à mon front.*

Gagengȣaton, *passer à costé.* Ch.
ȣagennatagengȣaton, *j'ai passe à coté du* B.

Gagenhorogon, *boucher*, Ch. Gagenhorokton, θa, t.

Gagennha, *esté.* Gagennhagé, *pendant l'été.*
Gagenhihen — Kenȣagennhe, *cet été.*
Oia tsi etȣgennhe, *il y a deux ans.*
Gagennhioston, *avoir un bel été.*
Kagenhokte *vel* Kagennhiagon *v.* Kagennhongon, Ch. *passer l'été.*
Gagennhagarhaθon, S. *avoir grande secheresse.*

Gagennen, in comp. *debattre à qui aura.*
Gaiatagennen, R. nhe, nhag, nhasere; *disputer à qui aura une, &c.*
Onhȣentsiagennon, Ch. *disputer d'une terre à qui l'aura.*
Tȣ-askennen, extra comp.
ȣationskennha, *on debat à qui l'emportera.*
Gagennion, in comp. *vaincre, disputer.*

Garihȣagennion, Ch. *fermer la bouche à quelqu'un, le vaincre par raison.*

Garihȣagenniaton, Ch. θa, t, tanne; *l'exces de q. c. ou de quelque, ou en bien ou en mal.*

Atrihȣagennion, Ch. *disputer par parole, se quereller.*

Garengennion, R. nies, ni; *surmontre en force, adresse.*

Atkenniaton, Ch. θa; *estre beau.*

ȣasrihȣagenniat, *tu excedes, surpasses ma pensée.*

Jorihȣagenniaton ongnaχȣen, *je suis en colere au dela de ce que je peux dire.*

Tikenha θeten onȣa ontagarihȣagenniatanne: *Ce n'etait qu'un peu dernierement, mais maintenant il passera tout.*

Tȣ--askennion, Ch. extra comp. nies, ni, niese.

ȣaθiaskenni, *ils se surmontent l'un l'autre.*

Gandigonragennion, R. *vaincre l'esprit de quelqu'un.*

Gandigonkennion, R. *tromper quelq. lui presentant q. c. et retirant le bras.* Sumit notam local.

Gagennoron, impers. *pleuvoir;* re, resere.

Onnaogennere, *voila qu'il pleut.*

Jogennoron v. Jogennoreskon, *il pleut beaucoup.*

Taonχen jogennoreserannonhȣes, *il se plait à pleuvoir.*

Gagennoron, neut. S. *avoir de la pluye.*

ȣesagennore, *tu as eu de la pluye.*

Gagenrat, in comp. *blanc.* Kragen, extra comp. Ch.

Gragen, *je suis blanc;* sragen, haragen.

Gasiragenrat, *couverte blanche.*

Gagonskenrat *pro* Gagonsagenrat, *visage blanc.*

Gaȣakenrat, *chair blanche.*

Gagenrion, Ch. ries, ri, riese; *rouler, se veautrer,* in comp.

Atragenrion, *se rouler dans le cendres.* Ch. est etiam rel.

Gagenritaon, Ch. tas, tahȣe, tasere; *faire rôtir du blé ou autre chose.* Inde Agenrita, *du petit blé.*

Gagenron, Ch. *manquer;* re, r.

ȣagenre snon? *comme s'il manquoit.*

Rogenron si renteron, *rien ne luy manque.*

Ajogenron gati gen? *Parum ne foret?*

Gagenronni, R. *mepriser.* Vid. supra Ogenra.

Gagenraton, *dedaigner;* S. θa, t, tanne.

Gagentennion, S. *estre étourdi,* in comp.

Atiengȣagentennion, S. *estre étourdi du petun.*

Aθonagentennion, S. *estre étourdi du branle du canot.*

Atnigȣensagentennion, S. *du sang qui coule de la veine.*

Gagentoranni, R. *f.* torhas; *mettre une emplatre.*

Gagentoregȣan, Ch. *l'oster.*

Gagentoragȣanni, R. *f.* gȣas.

Segon gagentore, *il y a encore un amplattre.*

Gageron, *quelque chose ou quelquesuns être ensemble, vel ponere aliquos vel aliqua alicubi.*

Θo gageron agetsennen, *voila mes prisonniers qui sont là.*

Gannenstageron, *monceau de blé, quantité de blé par terre.*

Ken ȣakkeron, *je mets là.* Eθo skeron, *mets là.*

Gageronni, R. *f.* ronhas.

ȣahoñageronhas, *on a mis devant luy,* v. g. *de la pourcelaine.*

Gaget, Ch. ts, t; *gratter, doler.* Vel Gageθon, θas, t, θaθe.

Gannohȣageθon, *gratter une peau.*

Tageȣaget gesonne, *gratte moi le dos.*

Atket vel Atkeθon, *se gratter.* Ch.

Θosa tesatket, *ne te gratte pas.*

Gagetak, S. *carquois.*

Gage^c^te, S. *porter; pr.* dumtaxat in usu.

ȣakkete, *je porte;* sagete, rogete, jogete.

Inde forte Atketaton, 1^ae^ Conj.

Gage^c^ton, S. *collier à porter;* ȣakketon, sageton, raogeton.

Asara, *le collier qui se met au front.*

Orenta, *les 2 branches.*

Atketare, *le porter sur le front.*

Getȣt, θa, ten, tanne, Ch. *se montrer, paroitre par dessus.* Skat te ȣenniaȣe skat iogetȣt, 101.

Atketȣt, Ch. θa, ten, tanne; *se faire voir.*

Satketȣtanni, *va te montrer, va voir.*

JonketȣθakȣA, *une fenetre, seu par où l'on se montre.*

Intrat etiam in comp. Gaiategetȣt, Ch. *rem viventem se producere.*

Gagetskȣan, Ch. *se lever;* in comp. kȣas, ko, kohe.

Garontagetskȣan gaianderesera, *lever l'arbre de paix.*

Gagetskȣanni, R. *f.* kȣas.

Atketskȣan, Ch. *se lever;* Satketsko, *leve toi.*

Atketskȣanni, R. *f.* kȣas; *se lever pour faire place à quelqu'un.*

Gagon, Ch. heterocl. ks, g, χ; *manger.*

Igeks, iseks, iraks, iȣaks. V. conj. intrat in comp.

Gannataragon, Ch. *manger du pain.*

Gagon, *nomen* indecl. in comp. significat Bon.

Ohiagon, *bon fruit;* gannontaragon, *bonne bouillié;* ronnontagon, *il trouve le lait bon.*

Ronnegagon iotskarat, *il trouve bonne l'eau de vie.*

Iaȣagon, *cela est bon.*

Gagonhara, *le milieu ou le gros os du nez :* inde

Gagonharionni, *lieu sur le chemin des flamands, où il y a une longue montagne qui a une bosse et eminence au milieu.*

Nigagonhres, *dit on d'un long visage.*

Kagonhen, R. *donner de prisonniers.*
Te hoñagonhen, *on luy a donne un esclave.*
Tȣatkonhan, *estre donné*, Ch.
N. ȣaθiatkonhen, *il est donné pour N.*
Tȣatkonhenton, *de multis.*

Gagonnienston, Ch. *aimer, estimer;* θa, t, tanne.
Atkonnienston, S. *s'aimer, s'estimer, s'en faire accroire.*
Gagonnienston, R. *aimer quelqu'un, le caresser.*
Dicunt etiam Rogonnienst, *il estime bien sa marche.*

Gagonregon, Ch. kȣe, reg, reχe; *frappe, coigner, pousser.*
Gasgonreg, *pousse, frappe;* est etiam R.
Atatkonregon, Ch. *s'entrepousser.*
Gagonraseron, Ch. *donner quantité de coups;* est etiam R.
Atatkonreseron, Ch. Jegonreesθa, *marteau ou chose avec quoy on frappe.*

Gagonretsa, *le poignet.* Kagonretsiagon, *couper le poignet.*

Gagonsa, *visage.* Gagonsarogon, *visage balafre*, Ch.
Gagonsajagon, R. *donner un soufflet.*
Gagonsaȣenron, S. *ne rien prendre à la chasse.*
Gagonsannetarion, Ch. *foule de monde plusieurs visages joints.*
Gagonsȣtanni, R. *f.* θas.
ȣagatkonsaȣenrat, *j'ai montré le nez par dessus.*

Kagont, Ch. *ne pas retourner du lieu où l'on est allé.*
Te hatigont hondaregȣan, *ceux qui sont allés en guerre ne retournent pas.*
Iategagont, *c'est pour toujours.*
Gáiatagont, Ch. θa, ten, tanne; *demeurer, sans retourner.*
Gaiatagontakon, R. *être la cause qu'un autre ne retourne pas, ne pas le ramener.*
Atkont, Ch. *idem*, θa, ten.
Onni ȣaharkonten, *il ne retourne pas.*
Tȣatkontakon, Ch. *être la cause qu'on ne retourne pas.*
Θennon tejontkontakȣa te hotiagi, *qu'est ce qui arrête le monde à Montréal.*
ȣatisarihȣagontan garihȣanderen, *que ton peché sois sans retour.*
Ateratȣendagonten asaterientasa, *que ton propos soit pour toujours.*
Gaȣendagont, *tenir ferme dans ce que l'on a promis.*

Gagonton, *ignorer.* Garihȣagonton, Ch. *ignorer la chose.*

Gagȣan, Ch. gȣas, go, gohe; *cueillir, amasser, lever, prendre.*
Gagȣanni, R. *f.* gȣas, n, nire; intrat in comp. frequentissime.
Gaȣaragȣan, Ch. *prendre de la viande.*
Gaiatagȣanni, R. *prendre, tirer une chose vivante à quelqu'un.*

Gagohon, Ch. hes, ha, hese : *aller querir;* componitur cum omnibus fere verbis.
Gentsiagohon, *aller querir du poisson.*

Gȣannen & Gagȣannen, *grand l'estre*; nens, nha, nhasore : istud de rebus viventibus, hoc de inanim.

Gȣannen intrat in comp. et subditum nomini vel voci exprimit magnitudinem, v. g. Gannatȣannen, *grande ville;* Gannatsiȣannen, *grande chaudière.*

Gogȣannhaon, Ch. nhas, nha, nhasere; *devenir grand.*

Gagȣannhase, R. *être grand à quelqu'un.*

Gȣannhaton, in comp. act. Ch. *aggrandir;* θa, t, tanne.

Snatsiȣannhat, *aggrandir la chaudière.*

Gannonsȣannhaton, *aggrandir la maison.*

Atkȣannhaton, pass. Ch. θa, t, tanne; *enlever, prendre, engloutir tout.*

Atkȣannhatanni, R. *f.* ten.

Sagokȣannatanni Onnontio, *Onnontio a enlevé, s'est fait maitre de.*

Ogȣario, S. *animal domestique.*

Gagȣarion, Ch. ries, rie, riese; *quantité de monde se mettre en chemin.*

Gatke ehatigȣarie hotinnonsionni, *quand es ce que les faiseurs de cabane se mettront en chemin.*

Gagȣarieton, Ch. θa, t; *se mettre en chemin pour quelque chose.*

Sæpius assumit notam local. Onne ontajegȣarie, *voila du monde qui, &c.*

Gogȣarision, in comp. *droit.* Atagȣarision, pass. Garihȣagarision, cum red.

Kagȣaronton, S. *avoir des bosses.*

Gogȣaton, Ch. θos, θo, θosore; *aller jusqu'en quelque lieu.*

Onneiȣte ȣaskȣaθo, *tu as été à Onneiȣt.*

Gagȣaton, in comp. *courber.*

Garihȣagȣaton, Ch. *brouiller les affaires.*

Gagȣatagȣan, cum reit. *les redresser, les racommoder.*

Onsaharihȣagȣatago, *il a raccommodé les affaires.*

Tȣatkȣaton, Ch. *tuer avec l'arc ou fusil;* θa, t, θe.

ȣatekkȣat, *j'ai tué.* Te hokȣaton onte, *il a abattu une tourte.*

Atkȣatagȣan, pass. Ch. cum reit. *estre redressé.*

Esȣatkȣatago ne sandigonra, *ton esprit sera remis, rassuré, redressé.*

Tȣatentkȣaton, Ch. *redonner ailleurs un captif qu'on avait eu pour qu'il ait la vie.*

Gagȣegon, Ch. *tous :* caret sing. et duali (Senikȣekon).

Sȣagȣegonhag, *vous y soyez tous.*

Componitur etiam Gannatagȣegon, *tout le bourg.*

Agȣegon, adv. *tout.*

Gagȣegon, *être bouché, fermé,* in comp.

Gaskȣegon pro Gasagȣegon, R. *fermer la bouche à quelq.*; gȣeks, gȣeg, gȣeχe.

Ataskȣegon, pass. Ch. *l'avoir fermée.*

Aθahagȣegon, S. *le chemin être bouché.*

Atiatagȣegon, Ch. *estre constipé.*

Atrihȣagȣegon, Ch. *ne savoir rien d'une nouvelle.*

Gagȣennion, Ch. nies, nie, niese; *pouvoir.*
Askȣenni gati gen? *Le pourrais tu?*
Gagȣenniaton, neut. S.
Jaten tsi te jogȣenniat naonsahatkaȣe, *impossibile est ut desistat.*

Gagȣenraron, *être par ci par là en divers endroits.*
Jogȣenraron haronχa, *il entend par ci par là.*
Asen niagogȣenrare ganniege, *les 3 terres d'agnie;* imp. rarakȣe, f. rarag.
Asen niȣakȣenrare, *moy qui ay 3 terres différentes.*
Gagȣenraron v. Gagȣenraronnion, S. *bigarrer.*

Ogonstȣenrha, *barbe,* S. Ogónsθȣenrhes, *longue barbe.*
Te jonnhatogen raogonsθȣenrha, *a la barbe fourchue.*
Kagonsθȣenron, *en avoir,* S.
Kagonsθȣenrharanni, R. *la razer.*

Gagȣetaron, Ch. ron, re, ronne; *couper un morceau, lambeau de q. c.*
Skȣetare ne sasare, *coupe.*
Gagȣetaronse, R. *f.* ronhas.
Gasiragȣetaron, Ch. *couper un morceau d'étoffe.*
Atkȣetaron, Ch. *un lambeau se détacher.* Gagȣetarongȣan, Ch.

Ogȣentsera, *peinture rouge.*
Gàgȣentserarhon, Ch. *matachier de rouge.*

Gagȣentaron, in comp. *étendu par terre.*
Gaiatagȣentaron, Ch. re; *couché, étendu par terre de re viv.*
Atagȣentaron, pass. Ch. Atiskȣentaron, pass. S. *se coucher, s'étendre sur la terre.*
Satiskȣentare, *étends, couche toi sur la terre.*

Kagonȣenton, S. tons, ton, tonsere; *être malade.*
Te jagogoñȣentons, *on est malade.*

Ogȣitsa, *genouil.*

Gahaȣak, *avoir pour enfant.* Hihaȣak, *mon fils;* Hetsahaȣak, *ton fils.*

Gaha, anomal. *emporter.* V. conj.
ȣaχa, *j'ai emporté;* jesaha, jehoha, ejoha.
Gaha, R. *emmener quelq.*
ȣaonχihas, ȣaejengȣire, *on nous emmenne à la chasse.*
Gȣatiha, *on les a emmenés.*

Gahaȣio, *la neige, poudre.*

Gahaȣi, Ch. ȣis, ȣi, ȣisere; *apporter.*
Iχaȣe, isaȣe, rahaȣe, gahaȣe : V. conj. anomal. est etiam rel.
Goñjaȣisere, *je te viens apporter.*
Gahaȣiton, Ch. θa, t, tanne; *apporter de quel lieu,* cum nota local.
Skandiatarati enagohaȣiton, *on a apporté d'Europe.*
Gahaȣiton, *eloigner.*
Atkȣiton, Ch. *se retirer;* θa, t, tanne. Atkȣiton, pass.
Gahaȣitanni, R. *f.* ten; *apporter à quelqu'un.* Intrat in comp.
Gaȣennenhaȣi, R. *apporter le voix.*

Jesȣs hoñaȣennenhaȣis hatitsihenstatsi, *Les robes noirs apportent la voix de Jésus.*

Gaiatenhaȣi, R. *apporter quelqu'un.*

Gaiatenhaȣiton, R. *apporter quelqu'un de quelque lieu.*

Sumitur étiam neut. Garihȣioston nagiatenhaȣit ganniege, *C'est la foi que m'a amene à Agnier.*

Gaheȣo, Ch. *amener.*

Atatiateȣe, Ch. *s'amener soimême.*

Oskeronge ȣagatatiateȣe, *à peine me suis-je rendu ici.*

Gaiatateȣe, R. *amener quelqu'un.*

Kenθo ȣaχeȣe, *j'ai conduit jusqu'ici.*

Sateȣasennon ȣagaheȣe niontrendaientakȣa, *Elle a amené, elle est venue jusqu'à la moitie des prières.*

Est etiam rel. ȣahoñaheȣe, *on l'a amené.*

Gahasa, *passus, pas.*

Etiegahes v. Gahesonse, *on fait de grands pas.*

Tȣ aχaheson, *avoir de grands pas.*

Θo nieχahage, *combien de pas?*

Ohagenta, *suye de la cheminée.*

Gahagentóron, S. *estre sali de suye.*

Gahagentarigon, S. *être mangé de la suye;* riks, rig.

Gahagentencton, Ch. *abbattre la suye, ramonner la cheminée.*

Gahagentaȣagon, Ch. *la secouer.*

Gahatsi, S. *être enroué.* ȣaχatsi, *je suis enroué.*

Gahasen, Ch. sens, sen, senne; *tenir conseil, être assemblé.*

Gahasenton, Ch. *s'assembler souvent.*

Gahasentakon, Ch. *p.* & *f.* kȣa; *tenir conseil pour q. c.*

Gahensontion, Ch. *souffler dans la calumet.*

Kahenreton, S. θa, t, tanne; *faire un cry de nouvelle.*

Tajagohenretanne, *on vient en fesant le cry.*

Kahenractackon, S. *faire le cry pour q. chose.*

Gahenta, *prairie.*

Gahenton, Ch. tes, te, tonne; *aller le premier.*

Gahahenton, Ch. *faire le chemin.*

Gaihonhenton, Ch. *pescher à la façon des Onneiȣts qui chassent le poisson.*

Ohere, *canne de blé dinde, succets.*

Ganeriaχon, Ch. *en aller couper.*

Gaheragon, *en manger.* Aserag, *mange des succets.*

Aθeronni, Ch. *y en avoir beaucoup.*

Gahere, *estre couvert, vétue, avoir dessus.* S. *f.* rag; ȣakkere, sahere, rohere.

Ehorag, *qu'il soit couvert de sa robe.*

Roratie onnagentsa, *it y a sur luy une peau passée.*

Kaheren, *estre dessus;* rakȣe, re.

Θo gahere sontak, *ta chaudière est là dessus.*

In comp. Gaksahere, *un plat estre dessus.*

Gaharonnion, *quantité de choses être sur quelqu'un.*
Gaiatahere, *une beste ou autre chose vivante, &c.* Vide infra Gar.
Titkahere, *estre plein jusqu'à regorger.*
Titkannakȣahere onnenste, *caisse pleine de blé.*

Kaherhon, S. *faire cuire des citrouilles sur des pierres chaudes.*
Orakȣa, *une portion de telles citrouilles.*
Garakȣannegen, Ch. *en demander.*
Gaherakȣa, *plante de citrouille.*
Tsiatak niorentonte skaherokȣat, *une seule tige a sept plantes de citrouille.*

Gaheᶜta, *champ.* Johetθȣie, *terre en pointe.*
Joθetakton, *champ courbé.* Joθetagȣarison, *champ droit.*
Gahetonni, Ch. *faire des champs;* nisk, ni, nianne.
Gahetonnianni, R. *f.* nien.
Gahetajen, S. *avoir des champs.*
Jatonaronniaton ȣakketajentakȣe, *tout est gâté, perdu dans mon champ.*

Gahetkeñon, Ch. ens, en, ensere; *estre gâté.*
In comp. frequenter apud alias nationes.
Garihȣahetken, *méchante affaire.*
Gahetkense, neut. acq. *devenir mauvais à soimême.*
Gahetkenton, R. θa, t, tanne; *gaster, mal employer.*
Gahetkentsihon, Ch. *n'en pouvoir plus.*
Gahetkentanni, R. acq. *f.* ten.
Atatkenton, Ch. θa; *s'entregaster.*

Gahetkȣate, *estre courbé.*

Gahiȣentaon, Ch. θas, tanne, tasere; *douleur s'appaiser.*
Gahiȣentaon, neut. S.
Ostonha ȣagiȣentaon, *ma douleur est un peu appaisée.*
Gahiȣentaton, Ch. *ce qui fait appaiser la douleur.*

Gahiȣθion, Ch. θions, θie; *esguiser :* quando est passiv. est Parad. S.
Gahiȣθionse, R. *f.* ons.
Gahiȣθionkon, *eguiser avec q. c.* Onne johiȣθe, *cela est aigu.*
Intrat etiam in comp. Aserȣθion, Ch. *aiguiser une hache.*
Tagȣaserȣθionre, *éguise moi ma hache.*

Tiohiotsist, *chose salée.* Takkiosiston, *donne moy du sel.*
Gahiotsistarhon, *saler, être salé.* Ch. hos, he, hosere.

Kahogáton, Ch. tons, ton, tonsere; *éclairer.*
Te sogaton, *éclaire.* Tontaχogaton, *éclaire moi,* a Kahogatense, R.
Tiontogatonharakȣe, *chandelle.*

Gahontsi, Ch. *noir.* Inde Hatihontsi, *les négres.*
Gahontsista, in comp. Gahontsistio, *beau noir.*

Gahoñeja, *canot,* S.
Gahoñjonni, Ch. *faire un canot.*
Gahoñjonnianni, R. *faire un canot à quelq.; f.* nien.
Gahoñanniχon, Ch. *le coudre.*

Gahoñjonton, Ch. *estre à l'anchre; f.* te.
Gahoñjotáon, Ch. tas, tanne, tasere; *aborder.*
Gahoñjotaseron, *quantité de canots aborder.*
Gahoñjontagȣan, Ch. *desancher.*
Aθoñjontagȣan, pass. *idem.* Ch.
Gahoñaȣenron, S. *ne pouvoir pas contenir tout.*
Gahoñarion, S. *briser son canot.*
Gahoñaȣeronton v. rontaon, Ch. *canot tourner.*
Gahoñjo, *bon canot.* Gahoñaksen, *méchant canot.*
Gahoñagat, *canot que va viste.* Gahoñakste, *canot pesant.*
Gahoñjontion, S. *aller en canot, quitter le canot.*
Aθoñarégon, Ch. *mettre le canot à l'eau.*
Gahoñjogȣan, Ch. *le tirer de l'eau.*
Gahoñaratáton, Ch. *le lever en haut.*
Gahoñȣiseron, Ch. res, re; *traisner en chariot.* Est etiam R.
Takkonȣisere, *traine-moy.*

Gahȣae, *battre,* v. g. *le blé, les fezoles.*

Gahȣaeston, S. cum reit. *n'être plus en séve.*

Gahȣannhen, *lier,* R. Gahȣannhaston, gahȣannhaχon, atȣannhaχon, *être lié.*

Gahȣaseron, R. rons, re, ronne; *depouiller quelqu'un.*
Gahȣaseron, neut. acq. *estre depouillé.*
Gahȣaserongȣan, R. Aθȣaseron, pass. Ch. *se depouiller.*

Gahȣatase, Ch. *tordre, tournoyer;* ses, se, ser. Aθȣatase, pass.
Hotkon tehatonhȣentsiatases, *Cacodæmon circuit terram.*
Gannatatase, Ch. *faire le tour du village.*
Tȣakȣatasehon, R. *tourner à costé de quelqu'un.*
Te-hok-ratases, *il va et tourne de costé et d'autre.* S.

Kahonre, S. *fusil;* raohonre, *son fusil.*
Kahonrio jate sȣateȣaθa, *bon fusil que ne manque point.*
Kahonraksen tiotsakton, *méchant fusil, tortu.*
Tȣaθonrannegaron, S. *fusil crever.*
Tȣaθonriagi, R. *fusil se rompre à quelqu'un.*
Tȣaθonrotagȣan, *se debander.*
Aθonraratie, S. *porter la culasse derrière l'épaule.*
Aθonrah-re, S. *le porter sur l'épaule.*
Atetatserȣtarhon kahonre, S. *sous le bras.*

Gahȣendo, *isle.* Gahȣendoge, *dans un île.*
Hahȣendagerha, *les Hurons.* Gahȣendȣt, *il y a une isle.*
Gahȣendȣtonnion, *quantité d'isles.*

Gahȣengare, Ch. *raquettes.*
Gahȣengariaχon, Ch. *en aller couper.*
Kahȣengaront, Ch. θa, ten, tanne; *aller en raquettes.*
Aθȣengaront, Ch. *les mettre.*
Kahȣengarȣtagȣan, *les oster.*

Gahȣengare significat etiam *buchette, soit pour festin soit pour autre entreprise.*

Gahȣengaron, R. *donner cette buchette, ce billet.*

Gahȣengarontion, S. *la jetter en quelque cabane.*

Gahȣengarontiense, R. Gahȣengaraȣi, R. *la donner.*

Onne sȣatkennison ȣakkengaraȣi, *Vous voila assemblé à qui j'ai donne la buchette, le bulletin.*

Gahȣennonni, Ch. nisk, ni, nianne; *arrondir, plier en ronde.*

Gahȣennonnianni, R. *f.* nien.

Aθȣennonni, S. *estre rond.* Jothȣennonni, *celà est rond.*

Gahȣennonni significat etiam *diverses cabanes sans palissades, sans ordre.*

Gahȣennonnige, g-nagre; *je demeure dans un village sans palissade.*

Gahȣennonniasion, Ch. *desvellopper.*

Aθȣennonniasion, S. *estre desvelloppé.*

Ohȣenria, *flegme.* Aθȣenriontion, S. *jetter un flegme.*

Ohȣensta, *escume, boue.* Gahȣenstoton, S. *bouer;* θa, t, tanne.

Gahȣesen, Ch. sas, sa, sanne; *polir, doler, gratter escorce.*

Gahȣesaton, Ch. θa, t, tanne; *doler avec q. c.*

Gahȣesase, R. *doler à quelq.*

Kanneggȣesa, *petit fer dont on gratte les peaux.*

Gahȣisera, *force.* Akȣiseron, *s'efforcer;* atakȣiseron.

Gahȣiseñon, S. *estre accablé d'un fardeau, estre trop chargé;* ens, en, enne.

Onχȣisen, *je suis trop chargé.*

Gahȣisaton, S. *estre trop chargé par quelque chose.*

Gahȣinniaks, ȣakkȣinniaks, sahȣinniaks, rohȣinniaks, sagoȣinniaks.

Gahȣistoskon, Ch. *p.* et *f.* toske; *avoir froid.*

Gahȣistoon, S. *avoir eu froid.* Onne johȣisto, *cela est froid.*

Jotihȣistoon ongȣannoñonsera, *nos citrouilles ont eu froid.*

Gahȣistoton, R. *refroidir,* v. g. *la sagamité a quelq.;* θa, t, tanne.

Atahȣistoton, Ch. *se refroidir à soymeme.*

Ohȣistonsera, *graisse figée quasi refroidie.*

Gahȣistonserarhon, *engraisser.*

Gahȣistannaȣan, Ch. *le graisse qui etoit figée, se fondre.*

Gahȣistannaȣenton, Ch. *la faire fondre.*

Kakȣaton, Ch. θa, t; *tuer à la chasse oiseau ou beste.*

Θe nateskȣat oskennonton, *Combien as tu tué de chevreuils?*

Gakȣarinna, S. *dote d'une femme qui se marie.*

Gakȣarinnionton, Ch. *la porter dans la cabane où l'on se marie.*

Gaksa, *plat.* In comp. kerat; extra comp. gaksonni, *en faire.*

Gaksen, *laid, chétif,* in comp.

Hajataksen, *un chenitre, malfait.*

Garihȣaksen, *méchante affaire.*

Gaksaton, Ch. *gaster;* θa, t, tanne. Componitur cum infinitivo.

Gaksatanni, R. *gaster à quelq.*

Garihȣaksen, S. *estre méchant.*

Garihȣaksaton, pass. usitatius Atrihȣaksaton, Ch. θa, t, tanne.
Atriȣaksáon, R. *faire du méchant.*
Gaksenha, *idem* quod Gaksen, sed magis emphatice.
Gaiataksenha, *une méchante personne.*
Ataksen, S. *estre laid, vilain.*
Iotaksen v. Iotaksensa, *méchante chose.*
Ataksaton, Ch.; Atitaksaton, R. *gaster la fiente de quelqu'un.*

Akserie, *fil, filet.* Akserieta, in comp.
Gakserie, Ch. *faire du fil.*
Gakseriese, R. Gakserietonni, Ch. Gakserietonnianni, R. *f.* nien.

Gakste, S. *pesant;* te, teg. Intrat in comp.
Gaiatakste, *homme pesant.*

Gaksten, *vieillard,* S. Gakstensera, *vieillesse.*
Gakstenserio, *bonne belle vieillesse.*

Gaksia, *frère ou sœur aisné.* Caret singul.

Gaksot, *avoir pour grandpère ou grandmère.*
Raksôt, *mon g. père;* Aksôt, *ma g. mère.*

Gaiageñon, Ch. ens, enne, ensere; *sortir.*
Gaiagenseron, Ch. *sortir souvent.*
Gaiagense, R. acq. *sortir à ou sur quelq.*
Gaiagen^{e}ton, Ch. θa, t, tanne; *sortir par quelq. endroit.*
Gaiagentakon, Ch. *idem.*
Gaiagenhon, Ch. hons, hȣe; *tirer, mettre dehors q. c.*
Gaiageñon, non componitur cum vocabulo significante rem vel personam egredientem; sicut componitur sæpe cum nomine signante locum unde exitur, quare non dices Gaiatageñon sed Gaiatinnigeñon, *quelque chose animée sortir de là,* a Gaiata et innigeñon, de quo infra in 4ª conjug.

Gaiagon, Ch. aks, ag, aχe; *couper.*
Atiagon, pass. *être coupé.* Gaiakse, R. *f.* ks.
Tagiaks, *coupe moy cela.* Atiagi, R. *etre coupé à quelq.*
Kaiagon, Ch. *couper en deux.* Terhatijaks, *ils coupent en deux.*
De pluribus autem dic : Asen nihatijaks, *ils coupent en 3.*
Iagon, in comp. pro Gaiagon. Sic, Gannagariagon, *couper une perche.*
Iakse, R. Gannagariakse, *couper une perche à quelq.*
Iagon cum te affirm. et divisionis.
ȣaθoseriag, *il a passé l'hyver.* ȣaθagennhiag, *il a passé l'été.*
ȣatkannegaiag, *la pluye cesse.*
Kajahiagon, Ch. *passer la rivière;* ks, ag, aχe. Est etiam rel.
Kajahiakton, *l'endroit où l'on passe.*
Kajagon, Ch. *tirer de l'arc, du fusil.*
Tsiag, *tire.* Hetsiag, *tire sur luy.*
Kajakse, R. *tirer pour quelqu'un.*
Gaiaaχon, Ch. *aller tirer de l'arc, du fusil.*
Kaiagon, Ch. *gagner la partie.*

Gaiagonsera, *un morceau de peau à faire des souliers.*
Gaiaktanni, nisk, ten, nire, S. *etre arreté par le mauvais temps.*
Atiaktanni, pass. *idem.*

Gaianna, *piste.* Gaiannare, *il y a une piste.*
Gaiannaronnion, *il y en a beaucoup.*
Gaiannonni, *y avoir, en marquer.* Atiannonni, Ch.
Gaiannenhaȣi, *suivre les pistes de q. c. viv.*
Gaiannigen, Ch. *voir les pistes.*
Gaiannagennion, R. *vaincre quelqu'un à la course.*
Atiannison, Ch. *les pistes formés, savoir marcher.*

Gaianderesera, *noblesse,* S.
Gaiander, *homme ou femme considérable.*
Gaianderenston, R. *faire grand quelq. l'élever à la qualité de.*
Atianderenon, S. *être bienheureux.*
Jojanderensta^c^kon nongȣatonnheston, *la grace.*

Gaiare, *sac.* Gaiaronni, *en faire;* nisk, ni, nianne.
Gaiaronnianni, R. *f.* nien. Gaiarison.
Atiaronni, Ch. *se faire un sac.*
Gaiareȣe v. Gaiarenha v. Gaiarenhaȣi, *porter le sac, faire des présents.* Ch.

Te gaiasere, *chose double.*
Kajaseron, Ch. *donner un captif; pr.* re.
Kajasaron, Kajasaronnion, *mettre le feu à un arbre coupé, pour le couper en diverses buches.*
ȣaθojasa^c^renhatie etiongȣaronni, si, ires; *il va fumant, il marche portant du feu.*

Gaiason, Ch. sk, s, sonne; *nommer, appeller.*
Θennon jejatsk, *quel est le nom de cela?*
Jesȣs ronaȣaθa, *il se nomme Jésus.*
Atiason, Ch. *estre nomme.*
Gaiason, neutro-pass. *impf.* atskȣa, *f.* hajatseg.
Θennon isaiatsk, *Comment t'appelles tu?*
Nota istud neutro passivum usurpari semper quando est sermo de actuali possessione nominis; sed quando sermo est de nomine suscipiendo usurpatur passivum, Atiason, v. g. Jesȣs ehatias, *il s'appellera Jésus.*
Gaiasonnion de multis, *nommer diverses choses.*

Gaiata, *chose vivante.* Tseiatat, *une seule personne.*
Te gaiatage, 2 *animaux.*
Gaiatagon, *dans le ventre,* Ch. Giatagon, *dans mon ventre.*
Gaiatagȣan, *prendre quelque chose vivante.*
Gaiatagȣanni, *f.* gȣas.
Gaiatagohon, hes, he, ha; *aller querir chose vivante.*
Gaiataiesáon, R. *ne trouver pas celuy qu'on cherche.*
Gaiatajesen, Ch.
Gaiatannogaron, S. res, re, rese; *faire une perte.*
Gaiatannogareton, R. *causer perte à quelqu'un.*

Gaiataro, Ch. *être présent, assister;* rakȣe, rag.
Gaiataragon, *assister pour quelque chose.*
Atiatarakon, *aimer quelque chose, ne vivre et ne subsister qu'en cela.*
Gaiatare, *Image*, R. significat *peindre, être peintre; f.* ren.
Gaiataronnion, *quantité d'images.*
Gaiatare, R. *f.* ren; *peindre, mettre quelq. en figure.*
Gaiati, cum notâ totalitatis, *par luymeme, par luy seul.*
Diȣ ate hajati roteȣcjennonni garonhia jonhȣentsia onni, *Dieu a fait par luymême le ciel et la terre.*
Gaiatio, *bel homme ou femme.* Ch.
Gaiatioston, *rendre quelq. beau.*
Gaiatase, Ch. *jeune femme :* dicitur etiam de homine.
Gaiatagaion, *âgé de 50 à 60 ans.*
Gaiatasterist, *homme ou femme beau à voir.*
Gaiataterjon, S. ri; *faire une bonne rencontre.*
Ongiatateri, *j'ai fait une bonne rencontre.*
Gaiatison, R. *pr.* et *f.* sa; *faire créer.*
Diȣ sagoiatison ongȣe, *Dieu a fait l'homme.*
Atiatison, Ch. sas, sa, saanne; *estre vieux.*
Gaiationni, *estre étendu, couché par terre.*
Gaiatonni, *une poupée.*
Gaiatoton, *trahir quelq.* R.
Gaiatȣten, *estre ainsi fait, avoir cette coutume; pr.* t. tennen, tenhag. Neθo, nigiatȣten, *Je suis ainsi fait.* Vide ȣten.
Kajatoᶜreton, Ch. θa, t, tanne; *examiner, penser, deliberer sur quelq. c.* Est etiam R. Te hoñajatoreθa, *on pense à luy.*
Kajatoretakon, *examiner quelque chose pour,* &c. Ch.
Gaiateñon, Ch. tens, tenne, tensere; *tomber.*
Gaiateñon, neut. acq. Ongȣajatens, *une chose vivante m'est tombée.*
Gaiatenton, R. *faire tomber à quelq.;* θa, t, tanne.
Atiatenton, Ch. *se faire tomber.*
Gaiaktanni, *f.* ten. Atiaktanni, neut. S. *etre arreté.*
Gaksaa, *petit enfant*, Ch. Gaksata, in comp.
Gakstesθa, *petite fille.* Gaksatio, *belle enfant.*
Gaksatajen, *avoir un enfant.*
Gaksôta, *estre grand père ou grande mère.*
Raksota, *mon grand père;* hiaksota, *ton g. père;* roksota, *son.*
Aχiksot ogon, *nos grandspères.* Gaksotsera, in comp.
Gakste, *pesant*, S.
Gaiehȣáon, S. hȣas, hȣa, hȣasere; *avoir besoin.*
Gaiehȣatanni, R. *rendre indigent.*
Gaien, *y avoir; impso.* takȣe, *imp.* tag, *f.* tasere, *f.* n. Componitur cum omnibus fere nominibus.
Gaien, S. *posséder.* Iȣagien, *j'en ai.* Jsaījen, ihoien, joïen.
Jaten te ȣagasaraien, *je n'a point de couteau.*
Gaien, Ch. *mettre en quelq. lieu.*

Isi snatsiaien, *mets la loin la chaudière.*

Gaiennon, Ch. *aller porter, mettre en quelq. lieu.*

Seksajenne, *va porter la plat.*

Gaienni, R. *f.* enhas; *mettre à quelq. mesdire de quelq.*

ȣagonriȣajenhas, *je te mets l'affaire entre les mains.*

Hesnontarajenhas, *garde, mets luy de la sagamité.*

Gaienton, multipl. *y en avoir en quantité,* S.

Jagoienton, *on en a en quantité.*

Gaientaon, S. tas, tanne, taȣere; *posséder, avoir.*

Niahoθennon taongi tanne tsinni rannregagaoθa, *je ne puis rien avoir tant il est yvrogne.*

Gaientatie, Ch. *aller en ayant quelque chose.*

Jaten hoθennon te ȣagientatie, *je n'apporte rien.*

Gaientaon, *tomber,* Ch. ȣahajentanne, *il est tombé.*

Kajen, Ch. *jouer, parier; imp.* Enhakȣe, *f.* en, *f. n.* enne.

Taetnien, *jouons nous deux.* Te gienne, *je vas jouer.*

Kajentakon, *prs.* et *f.* kȣa, kȣanne, Ch. *jouer quelque chose.*

Ostarakȣa te gientakȣanne, *je vas jouer de la rassade.*

Kajenni, R. *jouer pour quelq.* N. te hoñajennire, *on va jouer pour N.*

Gaien v. **Gaieña,** *avoir pour enfant.*

χeiña, *c'est ma fille, ce sont mes enfants.*

Hieña, *c'est mon fils;* Sagoieña, *sa fille;* Roieña, *son fils.*

Gaien onton, *devenir enfant de q.*

Onne roieña jotañon, *il est devenu son fils.*

Onnontio songȣajeña, *Onnontio nous a adopté pour ses enfans.*

Gaieon, *estre éveillé; pns.* habitum significans, Ihaies, *il s'éveille; pns.* actum significans, Ihojeon, *il est éveillé; f.* Ehaja. Tsnie, *éveillez vous.*

Gaiete, R. θa, t, tanne; *éveiller quelqu'un.*

Gaiehȣat, Ch. *estre éveillé.*

Raiehȣat, rajehȣatakȣe, *il est, il étoit éveillé.*

Atiehȣat, Ch. *se tenir éveillé.*

Hontiehȣaθa, *solent vigilare.*

Hondatiehȣat, *actu vigilant; f.* ehontiehȣaton, ehondatiehȣatag.

Atiehȣat, R. *veiller quelq.*

Hoñatiehȣaθakȣe rannaskȣa, *on veillait le captif.*

Gaiehȣaton, *se tenir éveillé pour quelque chose.*

Naie jongȣajehȣaθa si ontajon χirorianne, *ce qui nous tient éveillés, c'est qu'on nous a donné nouvelle.*

Gaienna, Ch. nas, na, nasere; *prendre,* est R.

N. ȣasagorienna, *N. l'a pris.*

Te sagoiatannegen, *il en a pris 2.* Itienna, *prends.*

Gaiennaȣagon, S. *embrasser, tenir ferme.*

Te ȣagiennaȣagon Jesȣs raorihȣa, *j'ai embrasse l'aff. de Jésus.*

Gaiennaȣase, R. *aider quelq.; f.* ȣas, ȣasere. Tagiennaȣas, *aide moy.*

Gaienna, *huile,* in comp. Genje, extra comp.
Gaiennarhon, Ch. hos, ho, hosere; *frotter d'huile.*
Jaten te ȣȣagiennajen, *je n'ay plus d'huile.*
Gaiennat, *il y a de l'huyle la dedans.*
Gaiennare, *il y a là de l'huyle.*
Gaiennógȣan, Ch. *lever l'huyle ou graisse liquide.*

Oiengen, *abbrevoir des bestes fauves.* Oiengensera, in comp.
Atiengenserannonna, *estre à l'affût.*
Atiengensori; gaiengenseraraon, *venir à l'abbrevoir, y arriver,* dicitur tam de homine qui insidias ponit quam de belluis.

Ojengȣa, S. *petun.* Gaiengȣio, *bon petun.* Ojengȣatet, *petun fort.*
Atiengȣison, *le petun est meur.*
ȣagatiengȣisaanni, *le petun est meur pour moi.*
Gaiengȣata, *en mettre dans le calumet.* Ch.
Tagien gȣatas, *mets moi du petun.*
Gaiengȣagasta, *consommer du petun.*
ȣaskiengȣasas, *tu consommes mon petun.*
Te gatiengȣakariask, *je suis malheureux n'ayant point du petun.*
Gaiengȣannion, S. *etre chiche à donner du petun.*
ȣagatiengȣanninnonre, *je viens acheter du petun pour moi.*

Gaiengȣire, *flèche.*
Gaiengȣiron, Ch. res, re, rese; *chasser, aller à la chasse du cerf.*
Gaiengȣironse, *chasser pour quelq.* R.

Garihȣaiengȣironse, R. *quereller, accuser.*

Gaienneñon, in comp. ens, enn, ensere; *tomber.*
Garihjenneñon, *l'affaire tomber.* Ch.
Garontienneñon, Ch. *arbre tomber.*
Gaienneñon, S. *tomber sur quelqu'un.*
ȣahorontiennens, *un arbre est tombé sur luy.*
Gaiennenton, *faire tomber.* Similiter in comp. θa, t, tanne; est etiam R.
Gaskontariennenton, *faire tomber escorce.*

Gaienrha, extra comp.; Ojengȣara, in comp., *fumée.*
Gaienrhare si etiongȣannonsȣte, *il y a de la fumée dans notre cabane.*
Gaienrharáon, si, ras, ranne; *avoir de la fumée.*
Etiengȣaronni, *il y a de la fumée.*
Atiengȣaronni, Ch. *estre à la fumée, en avoir.*
Atiengȣaronniation, Ch. *en causer par q. c.;* θa, t, tanne.
Est etiam R. ȣaskȣatiengȣaronniat, *tu me fais de la fumée.*
Gaiengȣarȣtanni, R. *f.* θas; *donner signal par la fumée d'un feu fait exprès.*
Atiengose, S. *éblouy de la fumée.* Kaiengȣarose, *idem.*

Gaienratonni, R. *mesdire de quelq., l'offenser par rapport.*

Gajenseron, Ch. rons, re, ronne; *escorcher.*
Gaienseronse, R. *f.* rons. Atienseron, pass. *etre ecorché.*

Gaienreñon, R. *se blesser, se mettre une épine au pied.*

Ojente, S. *du bois*, extra comp. Gaienta, in comp. *bois.*

Gaientonni, Ch. *faire du bois.* Gaientonnanni, R. *f.* nien.

Atientonni, pass. S. *y avoir du bois.*

Iotientonni si etiongȣannataien, *il y a bien du bois là où est notre bourg.*

Gaientagohon, Ch. *aller querir du bois.*

Gaientagȣan, Ch. gȣas, go, gohe; *faire, lever du bois.*

Gaientagȣanni, R. *f.* gȣas; *en faire pour quelqu'un.*

ȣahoientagaten, *il y a bien du bois.*

Gaientȣt, *il y a un bucher.* Gaientȣton, *il y a plusieurs buchers.*

Gaientȣtagȣan, Ch. *enlever, defaire un bucher.*

Gaientȣtagȣanni, R. *f.* gȣas.

Gaienton, R. θa, t, tanne; *frapper.*

Skajenton, *rendre la pareille, refrapper.*

Gaientatonton, R. *satisfaire pour quelqu'un blessé ou tué.*

Gaienton, Ch. *faire tendre les lacets au chevreuil.*

Gaientonnon, *en aller tendre.*

Gaienθon, Ch. *avoir des champs;* θos, θo, θosere.

Ka etisaienθon? *Où as tu ton champ?*

Gaienθoton, Ch. *faire son champs de quelque chose.*

Gaienteron vel **Gaienteréon**, *connoitre, s'accoutumer*, Ch. tes v. ten, terenne, terese.

Quando signatur actualis notitia dic Gienteri, *je le sais bien* : a quo formantur Gienterinnen, *sciebam;* Agienterenne, *sciam.*

Quando autem signatur notitia habitualis dicendum : Iaten te skienteres? *non me nosti?*

Gatihȣajenteron, Ch. *savoir l'affaire.*

Gaienteton, *faire connoitre.*

Naie hoñajenteton, *on le connoit par cela.*

Gaieren, *faire*, Ch. rha, re, sanne; *dire.* Garihȣajeren, Ch.

Sahojerat, *c'est sa coutume, son ordinaire.*

Saojerat v. Saot v. Saejatȣten, *c'est la coutume.*

Atieren, depon. *faire.* Hot nisatierha? *Que fais tu?*

Atieren, pass. Hot njotieren jonhȣentsiagon? *Quid fit in inferis.*

Gaieraton, *faire ainsi, de cette façon.*

Atieraton, S. *etre fait ainsi.*

Gaierase, R. *f.* ras; *faire à quelqu'un.*

Gaieren, cum reit. *ressembler*, quasi dicerent : *refaire.*

Sojeren ronniha, *il ressemble son père.*

Atieren, cum reit. *estre semblable.*

Te skiatieren, *elles se ressemblent.*

Gaieri, *quatre.*

Gaierion, cum te affirm. *estre juste accompl.;* ris, ri, risere.

Iate gaieri v. Gaieri tsihon, *it y en a autant qu'il en faut.*

Gaierise, R. *f.* ris : Eȣagieris, *j'en aurai assez.*

Garihȣajerion, Ch. *l'affaire estre juste.*

Kajeriton, act. Ch. ris, rit, riθe; *parfournir, donner le reste.*
Tatierit, *tu fais juste.*
Tasrihȣagerit, *tu dis vray la chose comme elle est.*
Karihȣajeriton, act. Kajense, R.
Jate songȣajens, *il nous a donné à tous ce qu'il nous fallait.*
Gaȣendajeriton, R. *accomplir la voix de quelqu'un.*

Gaieron, R. rons, ron, ronne; *faire tort.*
ȣaskieron, *tu m'as fait tort.*
Atieron, Ch. *fair un mauvais coup, faire méchant.* Atieronnion.

Gaieronge, Ch. *corps.*
Gieronge jotoñon, *il est devenu un autre moimême.*

Gaiesáon, Chi sas, sa, sasere; *etre pauvre, misérable.*
Gaiatajesaon, *ne pas trouver ce qu'on cherche.*
Gannenrajesaon, S. *une armée s'en retourner sans avoir rien fait.*
Gaiesaton, R. θa, t, tanne; *rendre misérable.*
Garihȣajesaton, Ch. *se railler de quelque chose.*
Ganniehajesáton, R. *ne pas venir manger ce qu'on avait preparé.*

Atiesaton, Ch. *abuser, prodiguer, ne tenir compte.*
Atiesatanni, R. *f.* ten.
Atiatajesàton, Ch. *se rendre impitoyable.* Depon.
Atiatajesatanni, R. acq. *se rendre impitoyable à quelq.*

Gaiesen, non est in usu, nisi in comp.
Gannenraiesen, *grande armée.*
Gannonserajesen, *citrouilles romaines grosses.*

Atiesen, *cela est facile;* ȣatiesen, ȣatiesennen, aontiesenhag.

Atiesen, *estre liberal,* S.

Gaieson, S. sons, son, sonne; *rire.*
Gaiesonnion, *plusieurs rire.* Gaiontienni, S. *éclater en riant.*

Kajeston, Ch. θa, t, tanne; *adjouter, mesler.*
Gannatarok kahik te gaieston, *pain assaissoné de fruit.*
Kaihestanni, R. *f.* ten, tongatiesten, *adjoute m'en encore.*

Gaihonha, *rivière, ruisseau.*
Te jonnihahógen, *rivière fourchue.*
Te gaihonharoñȣa, *rivière qui vient de travers et se jette dans un autré.*
Si johoñasereñon, v. Tsi etiondatraon, *confluant de 2 rivières.*
Jonnihonhagȣaton, *rivière qui serpente.*

Gaionni, S. *collier de porcelaine.* Gaionjonni, *en faire.*
Te johahasen, *a 20 rangs.*

Gaioteñon v. **Garihonteñon,** S. te, ten, tensere; *être empèché.*
ȣagiotekȣe, *j'étais occupé.*
Gaiotennion, S. *plusieurs être empèches.*
Gaiotati, R. ts, ts, tire; *empècher, retarder quelqu'un, l'amuser.*
Atatiotati, Ch. *s'amuser soy-meme.*

Gaion, *entrer,* Ch. Gaionton, *faire entrer.*

Gaionȣe, *une claye d'osier pour faire sécher quelque chose.*

Gaon, *un van d'écorce.*

Gaonȣajen, *sorte de chant quand on fait festin de chien.*

Gaȣann-ka, Ch. *folatrer, jouer.*

Gaȣejenda, *addresse.* Gaȣejendaksen, Ch. *estre maladroit.*
Gaȣejennajanton, *adroit à tout.*
Gaȣejennagateñon, Ch. *faire quantité de choses avec addresse.*
Gaȣejennentáon, Ch. *se reposer, cesser de travailler;* tas, tanne, tasere.
Gaȣejennharaon, *avoir beaucoup d'occupations.*
Ateȣejennonni, Ch. *faire avec addresse.*
Gaȣejenteton, Ch. θa, t, tanne; *sçavoir* est R.
Gaȣejentetaᶜkon, *la main droite.*
Gaȣejentetáon, *idem;* tas, tanne, tasere. Est etiam R.

Gaȣejenθon, in comp. *etre calme.*
Gandigonraȣejenθon, R. *appaiser quelqu'un.*
Gandigonᶜraȣejenθoton, *appaiser avec quelque chose.*
Gandiataraȣejenθon, *le lac calmer.*

Gaȣejonta, *bec d'oiseau.*

Gaȣen, S. *appartenir à quelqu'un.* ȣageȣan, *mon bien.*
Gaiataȣen, *avoir pour sujet.* R.
Songȣajataȣen Raȣendio, *Dieu nous a pour créatures.*
Gaiataȣenston, R. *s'assujetir quelqu'un.*

Gaȣenda, Ch. *voir, présent.*
Tioton niaȣendage ennoȣarane, *la famille de la tortue a 9 voix.*
Gaȣendio, *parler bien.* Gaȣendaksen, *mal parler.* Ch.
Aθȣendaksaton, Ch. *parler mal, mauvaise langue;* θa, t, tanne.
Gaȣendaroten, *voix affable.*
Gaȣendasȣateñ, Gaȣennannegaron, *voix rude.*
Gaȣendasnore, Ch. *parler viste.* Gaȣendasaien.
Gaȣennarakon, *obéir à quelqu'un; pns.* et *f.* kȣa, kȣanne.
Gaȣennajesaton, R. *mépriser la voix de quelqu'un.*
Gaȣendasteriston, R. *estimer la voix de quelqu'un.*
Gaȣendaᶜteᶜton, S. *voix forte aigue.*
Gaȣendarision, Ch. *se dédire, defaire ce qu'on, &c.*
Atȣendarision, Ch. Gaȣennannoton.
Gaȣendatogen, Ch. *parole qui ne change point.*
Gaȣendasatáon, *etre convaincu, mis au sac.*
Gaȣennaráon, S. *regarder en songe.*
Gaȣennoretakon, R. *se moquer de quelqu'un.*
Gaȣennentáon, Ch. tas, tanne, tasere; *conclure quelq. chose, porter sentence, arrest, definir.*
Atȣendajenton, Ch. *parler haut en colère;* tons, ton.
Gaȣennaragȣan, R. *donner le désir d'un autre;* gȣas, go.
Gaȣennáton, S. *nier;* θa, t, tanne.
Gaȣennont, R. θa, ten, tanne; *mettre la voix de quelqu'un.*

Atȣennont, pass. akte ȣasatȣennonten, *tu expliques autrement sa voix.*

Gaȣendȣteñon, Ch. tens, ten, tensere, tenhag; *parler d'une manière.*

Atȣendȣteñon, Ch. satȣendȣten, *parle haut, fais le cry autour du village.*

Gaȣendȣtatie, Ch. *aller parlant comme quand ils vont en ambassade.*

Atȣendȣtakȣaton, R. *demander à quelqu'un quelque chose.*

Gaȣendanniont, Ch. *attacher, pendre la voix de quelqu'un;* θa, ten.

Atȣendanniont, Ch.

Gaȣendio, Ch. *estre le maistre.*

Gaȣendioston, R. *reconnoître quelqu'un pour maître.*

Atȣendioston, Ch. *se rendre le maistre;* θa, t, tanne.

Gaȣendiostakon, R. *obéir à quelqu'un pour quelque chose.*

Gaȣenton, *couper en large*, Ch. Gaȣentagȣanni, R. *f.* gȣas.

Gaȣera, *le vent.* Vide Oȣeron. Gaȣerio, *bon vent.*

Atkaȣera^ckȣan, *venter avec véhémence; pns.* kȣe, kȣa.

Atkaȣerátase, *venter en tourbillon en rond.*

Kanongati tagoȣerenhaȣit, *de quel costé vient le vent?*

Atkaȣerentáon, Ch. *le vent s'appaiser.*

Kaȣerogaton, S. *avoir vent devant.*

Ateȣeronton, Ch. θa, t; *avoir vent arrière.*

Keȣerarohon, S. *vent de costé.*

Gaȣeton, Ch. tonsk, ton, tonre; *enfanter.* Ateȣeton, pass. *idem.*

Gaȣie, *éventail.* Ateȣiaȣat, Ch. *esventer.*

Gaȣiahontsa, *aisle.* Kaȣiahontsont, Ch. *avoir des aisles.*

Gaȣinnon, *monialis, jeune fille pas encore mariée.*

Gahoñȣinnon, *trainer canot;* v. nes, ne, nesre.

Gaȣiongoton, R. θa, t, tanne; *une armée faire coup dans les champs.*

Gaȣionsera, *une navette.*

Gaȣira, S. *partus.*

Gaȣiron, R. *donner un enfant à quelqu'un, le lui attribuer.*

Gaȣirata, *la mettre dedans, engrosser.*

Gaȣiraksen, *méchant enfant.* Gaȣirio.

Gaȣirarharaon, Ch. ras, ranne, rasere; *avorter.*

Atatȣirarioon, Ch. *tuer sa production.*

Atȣironni, Atatȣironnianni, *se faire des enfants.*

Onne hotatȣironnianni ȣasagoteȣeton hotinnonsionni.

Atȣirajen, S. *animal avoir des petits.*

Atȣirajenni, R. acq. *f.* enhas. Atȣirannonste, S. *aimer ses petits.*

Gaȣisa, extra comp. S. *glace.* Joȣise, *il y a de la glace.*

Gaȣisera, in comp. Egaȣiserat, Egatenti, *je partirai quand il aura de la glace.*

Gaȣisanniraton, *le glace estre forte.*

Gaȣisogȣan, Ch. *la glace se déprendre.*

Atȣitsiagi, *la glace se rompre sous quelqu'un.*

Gaȣisoserhon, Ch. *l'eau surnager sur la glace.*

Kaȣitskȣan, Ch. *glisser.* ȣatioȣiskȣat, *il fait glisser.*
ȣatioȣiskȣentare, *il y a du verglas.*

Oȣisk-ra, *gresle.*
Gaȣiskerontion, Gaȣisontion, *tomber de la gresle.*

Gannaarhon, Ch. hosk, ho, hosere; *escrire.*
Gannaarhose, R. *f.* os; *escrire à ou pour quelqu'un.*
Gannaarhontsera, *escriture.*

Onnaa^cta, *un plat costé.* Gnaatakske, *au costé.*
Gannaatihen, Ch. *avoir mal au costé.*

Onnagara, *corne.* Kannagaront, S. *avoir des cornes.*
Te jotinnagaronton, *des moutons.*
Gannagáronni, S. *etre considérable.*
Kannagarȣt, S. *etre assis sur son derrière, accrouppi.*

Gannágare, *perche, grand baston.*
Gannagariagon, Ch. *couper une perche.*
Tsonnagariagon, *castor.*
Gannagararohon, Ch. *perche de travers.*

Onnagensa, *peau passée.*

Gannagȣaton, Ch. ts, t, θa; *semer.*
Gannagȣati, R. *f.* ts; *semer pour quelqu'un.*
Gannagȣatsera, *semence.*
Gannagȣatserison, Ch. *avoir achevé de semer.*

Onnagȣara, *peau d'homme ou de —.*

Gannagre, Ch. gre, greg; *demeurer, y avoir, etre.*
Jaten te skannegorhannagre, *il n'y a plus de porcelaine.*
Jaten te tsiennagre, *il m'y a plus personne.*
Katke tsi snagre, *Combien? quel âge as tu?*
Gannagratsera, *lieu où l'on demeure, la terre, son pays.*
Taonχen sȣannagratserio, *O le beau, bon pais que le vôtre.*
Gannagraton, S. θa, t, θa; *s'habituer en quelque lieu.*

Gannagreñon, S. *avoir abondance de q. ch.;* ens, ens, ensere.
Ronnagrenseron, *il a beaucoup de.*
Gannagrenton, S. θa, t, tanne; *faire avoir abondance*, est R.

Gannageranni, R. *f.* ren; *imiter quelqu'un.*
Gannageraton, Ch. *se servir de règle, juger par q.*
Atennogeraton, depon. Ch. θa, t, tanne.
Naie jagȣatennageraθa onne ajehejonsere, *Nous connaissons, jugeons par cela qu'on va mourir.*

Onnahost, *citron.*

Gannaie, Ch. *glorieux, superbe, arrogant.*

Gannaie, *sac de toile.*
Gannajetakon, R. *se moquer de quelqu'un, railler, leur attribuant ce qu'ils n'ont pas; p. & f.* kȣa.

Ganna^ckon, S. Raonnakon, *sa quaisse, tambour.*
Ganna^ckonni, Ch. *en faire une.* Gannakonnianni, R.
Ganna^ckȣi, *la quaisse est pleine.*

Ganna^{c}kȣihen, *elle est à demi pleine.*

Ganna^{c}kȣagarerastou, Ch. *battre la quaisse.*

Ganna^{c}kȣa, *mariage, coitus,* Ch.

Ja^{c}ten ranna^{c}kȣio, *il n'est pas bon mary.*

Ganna^{c}kȣare, Ch. *p.* rha, *f.* ren; *faire mal.*

Ranna^{c}kȣarhanniousk, *il est à toutes les femmes.*

Ganna^{c}kȣagarien, Ch. componitur cum infinitis prope.

Ganna^{c}kȣaχȣan, R. *enlever la femme d'autruy.*

Ganna^{c}kȣenhaȣi, Ch. *mener sa femme avec soy.*

Gannakȣagenteiase, R. *perdre sa femme.*

Gannakȣáton, *estre faché par quelque chose;* θa, t, tanne.

Ronnakȣat, Rotannakȣat, *il prend plaisir à faire fascher le monde.*

Gannakȣatanni, R. *f.* ten; *fascher quelqu'un.*

ȣahagnakȣaten, *il m'a fâché.* Ronnouȣenserannakȣat.

Gannakȣeñon, S. *de dépiter, être en colère;* χȣens, kȣen, ensere.

Ganna^{c}kȣase, R. *mettre quelqu'un en colère.*

Gannaχȣentáon, S. *la colère s'appaiser.*

Gannaχȣensera, *colère.*

Gannakiȣan, R. *ne pouvoir attraper à ce qu'on pursuit.*

ȣagȣannakiȣe okȣari, *nous n'avons pu joindre l'ours.*

Gannakte, S. *natte, lieu où l'on couche.*

Gannaktohare, Ch. *laver la natte,* dit on quand on jette de la porcelaine sur un corps mort.

Gannaktaseronni, Ch. *faire accommoder sa natte.*

Gannakti, S. *un fuseau au bout duquel est enté un petit baston que les enfans font courir sur la glace.*

Gannaon, in comp. nas, nanne, nasere; *regretter.*

ȣagonhȣentsiannanne, *je regrette ta terre.*

Hontennasere rotiksten ogoña, *les anciens vont.*

Gannannon, act. *remplir;* nas, ne, nanne.

ȣahannanne skajarat, *il a rempli un sac.*

Gannannon, pass. *être rempli.*

Onne ratinnannons v. ratinnatsihon, *tout est plein, ils remplissent la cabane.*

Gannannaȣan, extra comp. S. *être humide, mouillé.*

Jonnannaȣan, *cela est humide.*

Gannannaȣenton, S. *humecter.*

Gannaȣan, in comp. Ganniannaȣan, *des mitaines,* S.

Onnenhannaȣan, *du blé trempé dans l'eau.*

Gannaȣenton, in comp. Gasirannaȣenton, *humecter, mouiller une couverte.*

Ja^{c}ten sorihȣannaȣan, *il ne prend plus en jeu.*

Ja^{c}ten te tsiorihȣannaȣan, *ce n'est plus un jeu.*

Gannanni, R. *injurier quelq.* ȣasknanni, *tu m'injuries.*

Gannanniserongȣast, R. gȣas, go, gohe; *injurier beaucoup.*

Gannanniharon, *idem.*

Gannaȣa, *rivière.* Gannaȣate^c^ton, S. *rivière rapide.*
Gannaȣandóron, pass. S. Ongnaȣannorons, *mihi est difficilis fluvius.*
Gannaȣen^c^ton, Ch. θa, t, tanne; *descendre la rivière.*
Gannaȣaráon, Ch. ras, ranne, rasere.
Gannaȣatéron, Ch. ros, ro, ronne.
Jonnaȣerȣt, *source, fontaine.*
Gannaȣakeha, *loup cervier.*
Onnaȣatsista, *sorte de mouche.*
Onnaȣe tsonnito, *testicules du castor.*
Onnaȣenskeri, *balieures.* Gannaȣenskerinnigeñon, *jetter dehors les ordures.*
Onnaȣatsta, *boue, terre grasse, &c.* Onnaȣatstage, iges, *je, &c.*
Gannaȣatstarhon, *bouziller*, Ch.
Gannaȣatstannetska, *terre, boue glissante, mouvante.*
Onnáȣak, *crible.* Gannaȣagon, S. *cribler.*
Onnaȣenha, *moustache*, S. signat etiam *ce q'on met en travers comme une tringle. pr.*
Gannaȣi, S. ȣis, si, ȣisere; *prendre quelque chose soit à la chasse avec des trappes, soit à la pesche.*
ȣahotsiannaȣi, *il a abondance de poisson.*
Onnaȣi, *dent*, S. extra comp. ȣagnaȣige, *à ma dent.*
Gannaȣira, in comp. gannaȣires, *dent grande.*
Gannaȣirio, *bonne belle dent.* Gannaȣiragetȣt, S. *dent se montrer.*
Gannaȣirannoñagon, *y avoir mal.*
Gannaȣirȣθie, S. *dénts aigues.*
Kannannet, *être double*, Ch. θa, t; sumitur etiam active.
Kannannetarion, *avoir beaucoup de do^s^;* active sumitur in comp.
Te horihȣannetarion, *il a joint diverses choses.*
Kannia, *pierre à fusil.*
Kanniohare gaiengȣire, *fleche ayant une pierre au bout.*
Gannas, Ch. *être couché*, anomal. Gannaskogon, *dans le sein.*
Gannaskȣagon ȣahorori, *étant couchés ensemble, il luy a dit.*
Onnas, S. *plume.* Gannasont, *avoir des plumes.*
Gannasôtagȣan, Ch. *oster les plumes, les arracher.*
Gannasôtagȣanni, R. *f.* gȣas.
Gannaskȣa, Ch. *esclave, estre esclave.*
Gannaskonni, R. *faire un esclave.*
Atnaskonni, Ch. *se faire prisonnier.*
Gannaskȣeȣe v. Gannaskȣenhaȣi, *amener des prisonniers.*
Gannasta, *perches à faire cabane, celle de dedans que l'on courbe pour servir de moule à la cabane.*
Gannastȣt, Ch. *les dites perches être mises.*
Gannastonni, *les mettre*, Ch.
Gannáta, *village.* Gannatȣannen, Gannataȣiriens, *grand village.*
Nigannataa v. Nigannatasa, *petit village.*
Kannátakȣan, Ch. *pns.* et *f.* kȣa, kȣe; *n.* kȣanne.
Gannatonni, Ch. *faire un fort.*
Gannationni, *là où est le fort, l'armée est campée.*

Gan^{c}nata, S. *sac à petun ou autre petit sac, pochette.*
Gan^{c}natatsera, in comp.
Gannatatserȣrarhon, R. *mettre le sac à petun à quelq.*
Gan^{c}natatserage^{c}te, S. *porter un sac comme les vieillards.*
Onnátak, *crapaud.*
Gannátarok, *pain,* S. Gannataronni, *faire du pain,* Ch.
Gannataronnianni, R. *faire du pain à quelqu'un.*
Gannataronniaton, Ch. *le faire de quelque chose.*
Gannaton, *nommer,* Ch. tons, ton, tonne; est etiam R.
Hesnaton, *nomme-le.*
Gannatonkon, Ch. *nommer comme cela, de ce nom;* kȣa, kȣe.
Gannatonni, R. *f.* tonhas; *montrer à quelqu'un quelque chose.*
Tagnatonhas, *nomme, montre moy cela.*
Gannatsa, *clunes.* Gnatsaske, *ȧmes.*
Gannatsarégon v. Gannatsaiagon, R. *fouetter;* ks, g, χe.
Gannaθaron, Ch. res, pro habitu; re, pro actu; *f.* re, *fn.* resere, *visiter.*
Gannatareskon, *elle visite souvent.*
Jesannaθarennaȣire, *on te vient visiter.*
Gannaθaron, R. Gnaθahre, *je viens visiter.*
Kanne, *graine de semence, blé ou autre chose.*
On^{c}nega, S. *eau;* Gan^{c}negio, *bonne eau;* Gan^{c}negaksen, *méchante eau.*
Gannagaksaton, *gaster l'eau,* Ch.
Gannegonni, *faire de l'eau,* Ch.
Atnegonnion, Ch. *se fondre, se dissoudre.*
Atnegontion, Ch. *eau bouillir.* Qngȣan^{c}negos.
Gan^{c}nego, *il y a de l'eau.* Gannegonnion, *il y en a beaucoup.*
ȣaongion^{c}nonne, *l'eau entre dans notre cabane.*
Onnegage ratentieskȣe Jesȣs : *Jésus marchait sur les eaux.*
Etgannegatironθa, *il y a marée.*
Onsagannegatire, *elle monte.*
Gannegañhonθon, *donner médecine.*
Gannegoon, *eau déborder,* S. Gannegogȣan, *oster l'eau de.*
Atnegogȣan, *l'eau sortir, se repandre.*
Ganneganni, R. *f.* gen, *demander.* Gannegen, *demander.*
ȣagonnegen, *je te demande.*
Gasaranneganne, *je viens demander un couteau.*
Gan^{c}negaron, S. *méchant.* Atennegaron, Ch. *devenir méchant.*
Gannégen, in comp. *joindre.* Te ȣasarannegen, *il y a 2 couteaux.*
Gannegenseron, *joindre beacoup de choses.*
Aχinnatannegenseron garennajenhaga aχinnatagarien, *nous défimes plusieurs villages Hurons.*
Garannégen, extra comp. Ch. Te srannegen, *joins ces 2 choses.*
Tȣatrannégen, Ch. *être joint l'un contre l'autre.*
Te tsiatrannegenhag, *soyes l'un contre l'autre.*
Gannegen, eum nota localit., *empirer.*
Ontagannegensere, *il va empirant.*

Onnegri, *herbe, foin, paille.*

Gannegriagon, Ch. *couper de l'herbe.* Asare jennegriakta, *une faux.*

Ganneg-ro, *de la paille ou autre ordure être dans l'eau.*

Eskennegrose, *tu feras tomber l'ordure dans* v. g. *ma sagamité.*

Gannegroskaron, Ch. *faucher, couper l'herbe.*

Gannegrenhe, *manche,* extra comp. Gannegrenhetsera, in comp.

Gannegrenthetseronni, Ch. *en faire un.*

Ganᶜnegaron, S. *estre méchant.* Rojatannegaron, *méchant homme.*

Kanᶜnegaron, in comp. *se crever, s'entrouvrir.* Karanᶜnegaron, extra comp.

Tȣatranᶜnegaron, Ch. *s'entrouvrir, crever.*

Tȣajataranᶜnegaron, S. *aller dur à la selle.*

Etȣatonhȣentsianᶜnegáre, *la terre s'ouvrira.*

Onnegorha, S. *porcelaine.* Raondegorha, *sa.*

Gannatsia, in comp. Ontak, extra comp. *chaudière.*

Ontakonȣe, *chaudière de terre.* Ontak otsogri, *chaud. ronde.*

Gannatsionni, *en faire.*

Gannatsianneron v. Gannatsianniᵉkon, *la raccommoder, recoudre.*

Gannatsionnikonse, R.

Gannatsiarȣton, Ch. *chaudière de guerre où les guerriers chantant.*

Gannehon, *une peau non passée,* extra comp. Gannehȣa, in comp.

Skannehȣat, *une seule peau.* Gannehȣio, *bonne peau.*

Gannehȣakste, *peau qui peze.* Onnehȣa, *peau mediocre, demy castor.*

Gannenhȣa, Ch. Gannenhȣasen, *avoir pour beau père ou belle mère. Imp.* takȣe, *f.* tak, Ch.

ȣagnenhȣage, *chez mon beau père ou belle mère.*

Snenhȣage. Gannenhȣasenton, de multis.

Ganᶜnekȣáón, Ch. *couler.* Eso ontagannekȣa ȣaθonannentsargarog, *il a bien coulé quand on l'a saigné.*

Onnenhare, *raison.* Ganneharon, R. *surmonter quelq.*

Ganneharon, neut. S. *estre vaincu.*

Ongennehare, *je suis vaincu,* v. g. *dans un festin où l'on ne peut pas tout manger.*

Gannéon, R. *vaincre; pns.* ȣas, quasi a Gannеȣaon.

Sagonneȣas, *il les a vaincus.*

Sagotinnéon agotsagannha, *il a defait les Loups.*

Gannehȣaton, *vaincre avec q. c.*

Naie jonχinneȣaθa jaten te jongȣahonraien, *on nous surmonte parceque nous n'avons pas de fusil.*

Ganneies, *grand,* Ch.

Ganneȣaron, R. rons, re, ronne; *surprendre.*

Gaiatanneȣaron, R. *donner une fausse alarme.*

ȣagonjatanneȣare ne gonnhongon, *je t'ay surpris, t'ayant oppelé.*

Ganneȣaraton, S. *sentir avoir mal au cœur, estre provoqué comme à vomir, à ouyr ou voir quelque chose desplaisante;* d'où vient ce mot si usité parmy les Agniers: Jonneȣarat, Jonneȣarata, *chose fesante mal au cœur.*

Ganneȣaratanni, R. *f.* ten.

Kannegota, *échelle.* Kannegotatiron, *la dresser*, Ch.
Kannegotiennenton, *la retirer, l'abbaisser.*
Gannenhison, Ch. sons, son, sonne; *faire sagamité.*
Gannenhisaonni, R. *f.* sen; *la faire pour quelq.*
Gannenhisaton, Ch. θa, t, tanne; *la faire de q. c.*
Gennenhisatsera, Ch. *assaisonnement.*
Onnentia, *blé:* Gannenhagaion, S. *vieux blé.*
Gannenhannaȣenton, *en faire tremper.*
Gannenhenson, *blé grouler dans les cendres pour faire de la farine épaisse.*
Gannenhensonᶜkȣa, *blé ainsi groulé.*
Gannenhensonkȣagon, Ch. *en manger;* ks, g, χe.
Gannenkaton, R. *peccare, rem habere.*
Onne'ja, *pierre*, S. Gannejonni, Ch. *faires des petites bales.*
Atnenjonnian, Ch. *pierre se former.*
Ganneñjat, *il y a du plomb dans le fusil.*
Onnenjogon, *dessous la pierre.*
Onnenyara, *il y a des pierres.*
Onᶜnennata, S. *pommes de terre.*
Ganᶜnennatágon, Ch. *en manger.*
Gannennatagȣan, Ch. *en cueillir.*
Gannennianni, R. *surprendre quelque bande ou armée, la defaire entièrement.*
Gannenton, Ch. tons, ton, tonne; *admirer*, est R.
Hoñannenton, *on l'admire.*
Gannennonton, *admirer à cause de q. c.*
Atatnenton, Ch. *s'admirer soymême.*
Kannennage, *l'automne.* Kannennagenne, *pendant l'automne.*
Kannennageka, *chose d'automne*, v. g. *canot, castor, &c.*
Gannenna, *hardes*, S. in comp.
Gannennio, *beaux habits, bonnes hardes.*
Atnennokte, Ch. θa, ten; *estre à bout de ses hardes.*
Gannennaton, in comp. Gannonsa gannennáton, *avoir envie sur la cabane, vouloir sa destruction.*
Songȣannonsagannennaθa Onnontio.
Gannenskȣan, Ch. kȣas, ko; *dérober.*
Gannenskȣaton, Ch. *lieu où l'on dérobe, ou chose pourquoy on dérobe.*
Onneñon, *s'affaiser*, in comp. est R.
Gaȣiseronneñon, *la glace s'affaiser*, S.
Gannenᶜra, *armée, bande, troupe de guerriers, compagnie.*
Gannenᶜronni, Gannenrorogon, *assembler l'armée ou compagnie.*
Gannenᶜraregon, Ch. *pousser l'armée, la faire marche.*
Gannenᶜrinnon, Ch. *aller en armée;* nes, na, nesere.
Gannenᶜrarion, R. *rompre, défaire l'armée;* ris, ri, risere.
Gannenragarien, R.
Gannenrȣt, *l'armée se poser.*
Gannenrȣtágȣan, Ch. *la faire lever.*

Gannenrentanni, R. *f.* ten; *dresser ambuscade.*
Gannenrajesaon, S. *armée s'en retourner sans rien faire.*
Atnen^c^raton, S. *armée estre perdue.*
Gannentsa, Ch. *bras.* Atnensaget, *le plier.*
Atnentsagȣarision, *le dresser.*
Kannentsaȣeston, *le percer, saigner.*
Gannentsa, R. *prendre le bras.*
Gannentágon, in comp. Garannentagon, extra comp. *estre attaché, collé, appliqué.*
Gannentakton, *attacher.*
Gaiatannentagon, Ch. *être attaché chose vivante.*
Gaiatannentakton, *attacher;* θa, t, tanne.
Hoñajatannentakton osȣengarege, te gaientannhare, *on l'attacha sur la croix.*
Garannentakton, Ch. *joindre, attacher q. c.*
Onnenste, *blé,* S. Gannenstontion, S. *semer.*
Gannenstarongȣan, Ch. *l'égrainer.*
Gannensto, S. *le mettre tout entier bouillir.*
Kannensto^c^kon, S. *l'assaissonner ainsi bouillie de.*
Kannenstiagon, Ch. *l'écraser entre 2 pierres.*
Gannenstasc, *blé nouveau.* Gannenstatken, *id. pourri.*
Gannera, *virga,* S. raonn.
Eθo si etȣagneristonte ȣagnonhȣaktannik, *doles in virga.* Signat etiam *peste.*
Ganneratarinnon, Ch. *la peste courir.* Neutraliter sumptum, *avoir la peste ou autre maladie contagieuse.*
Jongȣann-ratarinnes, *nous avons une maladie contagieuse.*
Fit etiam substantivum. Aseronnige etiotention onneratarinnes, *la peste est venue des Europeans.*
Ganneragoon, S. *admirer;* gȣas, go, gohe. Est etiam R.
Ganneragȣaton, S. *admirer pour q. c.*
Jonneragȣat, *cela est admirable.*
Rojatanneragȣaton, *c'est un homme admirable en beauté.*
Gannero^c^kȣannoñagon, Ch. *cupere, &c.*
Gannero^c^kȣenton, S. *s'être accouplés.*
Gannéron v. **Ganneragon,** Ch. in comp. *se méprendre.*
Garihȣanderagon, Ch. ks, g, χe; *pécher.*
Garihȣanderagi, R. *f.* ks; *faire pécher quelq'un.*
Garihȣanderakton, Ch. *pécher par quelque chose.*
Garihȣanderaχon, *pécher souvent.*
Rorihȣanderaskon, *grand pécheur.*
Gannonsannerágon, Ch. *prendre une cabane pour une autre.*
Gaiatannerágon, *prendre une personne pour une autre.*
Atȣennannerágon, *dire une parole pour une autre.*
Onnerasa, *tondre champignons.*
Onnerate, *feuille.* Ganneratont, *y avoir des feuilles;* θa, ten, tanne.
Gannera^c^tentaon, Ch. *feuilles tomber;* tas, tanne, tasere.

Onneregȣare, *bouclier.* Gannerekenθore, *fonds de caisse.*
Onnerenha, *vers.* Gannerenhat, S. *avoir des vers.*
Gannerenhata, Ch. *mettre des vers dedans.*
Gannerenhatatakȣan, Ch. est etiam R., *tirer les vers du corps.*
Atennrenhorioon, S. *estre malade des vers.*
Atennerenhorianni, S. *vers se remuer dans le ventre.*
Tagnonkȣatseranhonθo gontiagentakȣa onnerenha, *donne moy médecine pour faire sortir les vers.*
Ganneraθen, S. *être vieux, décrépit, blanc de vieillesse.*
Gannéron, Ch. *être enceinte.*
Ganneron, Ch. *lever des écorces;* rons, re, ronne.
Ganne^{c}rase, R. Ganneronhon, Ch. he, ha.
Gannesahre, *la neige porte*, Ch. Gannesa^{c}ronk.
Gannesen, Gannesenton, S. Si etionnesenton, *là où il y a du sable.*
Onnestagȣara, *crasse.* Gannestagȣaroron, *estre crasseux.*
Onne^{c}ta, *gomme, bray, pin.* Ganne^{c}tarhon, Ch. *gommer.*
Ganne^{c}taarongȣan, Ch. *estre de gomme.*
Eθo si jotnetonni, *là où est un pin.*
Gannexereñon, S. ens, en, ensere; *ignorer*, est R.
Garihȣannexereñon, S. *ignorer l'affaire, ne pas connoître.*
Gannexerenston, S. *faire ignorer*, est etiam R.
Ongnontarannexeron, *je ne sais ce que c'est que sagamité.*
Gannaháon, R. nhas, nhanne, nhasere; *commander.*
Atennháon, act. *commander*, Ch.
Rotennhaskon, *le grand commandeur.*
Gannhaton, R. θa, t, tanne; *récompenser* seu *commander par q. c.*
Θennon eskennhat, *que me donneras tu pour récompense.*
Gannhateñon, Ch. ens, en, ensere; *regretter q c.* est R.
Hoñannhátens, *on le regrette.*
Gannhatenston, Ch. *regretter pour quelque chose.*
Onnhate, *bûche fourchu, gros bois.* Tejonnhatogen, *fourchu.*
Gannhe, R. nhas, nhe, nhesere: *aider, défendre quelqu'un.*
Gatagonnhe, *aide moy.*
Gannhe, Ch. *défendre quelque chose, prohibere.*
Rannhesk Diȣ ajennesko, *Dieu défend le larcin.*
Est etiam R. Hagennhes, *il me défende, m'empeche de.*
Jotennhaskon, *une querelleuse à l'occasion*, v. g. *de ses enfants qu'elle protége.*
Kannheks, extra comp.; Gannhesa, in comp. *ceinture, babiche.*
Gannhesonni, *faire une courroye*, Ch.
Gannhesagȣetaron, Ch. *couper une babiche.*
Kannhen, in comp. *ceindre.*
Kannatannhen, *ceindre, assiéger une ville*, Ch. *f.* enhag.
Gaiatannhen, R. *ceinturer quelq.*
Atiatannhen, S. *etre ceint.*
Gannhaston, Ch. *se servir de q. c. pour ceinture.*

Gaiatannhaston, Atiatannhastion, Ch.
Gannhasion, in comp. *oster ceinture.*
Gaiatannhasion, R. sions, si, sionhe; *deceindre quelq.*
Jontiatannhasθa, *ceinture.*
Atiatanhasion, *ôter sa ceinture.*

Onnhenha, *urine.*

Onnheta, *porcépi.*

Gannhetien, S. Gannhetiensera, in comp. *femme.*
Gannhetienserio, *bonne femme.*
Gannhetienseraksen, *coureuse.*
Gannhetienserannonhȣéon, Gannhetienseragasθa, *aimer les femmes.*
Gannhetienserare, *il y a une femme.*

Gannhigon, S. his, hig; *ignorer, bégayer.*
Ganhȣannhigon, S. *ne savoir pas les affaires.*
Gannhiton, impers. S. θa, t, tanne; *faire ignorer.*
Jonnhit jagotrens, *on bégaye, on a de la peine à chanter.*
Gannhitannî, R. *f.* ten; *faire ignorer quelq.*
Atonnhitannî, pass. N. S. *f.* ten; *estre caché à soymeme.*
Kannhi, *grand baston dont on abbat les nids des tourtes.*

Gannhoha, *porte.*
Gannhohandoron, S. *avoir de la peine à ouvrir ou à entrer.*
Gannhohahȣiseñon, S. *parte difficile à ouvrir.* Neut. acq.
Gannhohajengȣiron, Ch. *frapper à la porte.*
Gannhohajagon, R. *provoquer au jeu quelq.*
ȣaonχinnhohajag, *on a frappé à notre porte, on nous a provoqué.*
Gannhohontion, S. *partir, abandonner sa porte.*
Te snihohatógen, *dresses la porte.*
Te gonninnhoharonnion, *plusieurs portes.*
Kannhote, *à la porte.* Skannhohati, *à l'autre bout de la cabane.*

Onnhonsa, S. *œuf.* Annhonsen, Ch. *pondre.* 1ae conj.
Onnhonsatarion, *elle a quantité d'œufs.*
Jonninnhonsajenta^{c}kȣa, *le nid où elle pond.*
Gannhonsaiesaton, Ch. *perdre ses œufs.*
Te jonninnhonsiagon, *elle a éclos.*

Gannhontren, terhaon in comp. *mettre bout à bout;* terha, tranne.
Te sasȣengarannhontren, *mets les planches bout à bout.*

Gannhonθon, R. *mettre dans la bouche;* D. θosk, θo, θosere.
Gannon^{c}kȣatserannhonθon, R. *donner médecine.*
Gannhonθoseron, R. *donner beaucoup.*
Gannhonθoton, Ch. *ce qu'on donne ou pourquoi on donne.*
Enninnhoskȣannhonθon, R. *prendre dans sa bouche pour le jetter dans la bouche d'un autre.*
Te senninnhoskȣarontat, *souffle ce que tu as dans la bouche.*
Atennhont, Ch. *avoir ou mettre dans sa bouche;* θa, ten.
Atennhontagȣan, Ch. *s'oster de la bouche.*

Gannhoton, Ch. tons, ton, tonne; *fermer la porte.*
Gannhotonse, R. Atennhoton, S. *se fermer.*
Atennhonse, neut. acq. *trouver la porte fermée.*
Gannhotongȣan, Ch. gȣas, go, gohe; *ouvrir la porte.*
Gannhotongȣanni, R. *f.* tongȣas.

Gannia, *doigt*, in comp. Ganniagatste, Ch. *estre cruel.*

Ganniagenon, *s'eschapper, guérir;* ens, en, ensere. Assumit notam reiteratio : Onsahanniagenne, *il s'est enfuy, il est guéri.*
Ganniagense, R. acq. *s'enfuir à quelq.*
Onsahoñatinniagens, *ils leur ont échappé.*
Ganniagenton, *faire échapper.*

Ganniagon, *se marier*, S. ks, g, χe.

Ganniagȣari, *Une ourse :* C'est le nom de l'Agnier.

Ganniaha, *manger repas.*
Areko ongenniahonsori, *je n'ai pas encore.*
Sȣanniahentaon, *vous avez mangé, dîné.*

Onniara, *tête coupée.* Θo ganniarah-re, *il y a la dessus une tête.*
Ganniareñon, *baisser la tête;* ens, enn, ensere.
Ganniarenton, R. *couper la tête, tuer des ambassadeurs ou autres venus;* askennen.
Ganniariagon, R. *couper le col.*
ȣagenniarenni ȣagnonhȣaktannik, *j'ai mal au col.*

Onniare, *serpent.*

Onniata, *gosier*, S. Ronniatonne, *à son gozier.*
Ganniataθenon, S. *avoir le gozier sec.*
Ganniatannaȣenton, R. *l'humecter, donner à boire.*
Ganniataraon, S. *estre pris au gozier pour avoir pris un trop gros morceau.*
Ganniatannoñagon, S. *avoir mal au gozier.*

Onniasa, *col.* ȣagenniasatske, *à mon col.*
Ganniasotarhon, S. hos, ho, hosere; *mettre au col.*

Ganniaskaron, *avoir le hoquet*, S.

Onniatsara, *porcelaine que les femmes attachent aux cheveux que leur pendent derrière la teste.*

Ganniat, S. *avoir des nasses.* Ganniatoon, *les mettre dans l'eau.*

Onniataraa, *toile.*

Ganniaskari, S. ris, rig, riχe; *agraffer*, est R.

Ganniatare, *lac.* Ganniatarigon, *traverser le lac.*
Ganniatariakton, Ch. *le passer pour q. c.*

Ganniatren, R. trens, tren, trenχe; *étrangler.*

Ganniahonkon, Ch. *enfoncer dans la neige molle.*

Ganniegóton, *oiseau rouge.*

Ganniejeñon, *avoir eu de la neige.* Impers. Onniente, in comp.
Ganniejenna, *il y aura de la neige.*
Gannientannaȣan, *neige molle.*
Gannientannira^c^ton, neut. impers. *la neige s'endurcir.*

Gannien, Ch. niha, nie, nianne; *japper*, est R. *japper à quelq.*

Ganniannion, *japper souvent*, Ch.

Jonniaskon satsennen, *ton chien est grand jappeur.*

Gannien, Substant S. *blé.*

Agȣa igen ongȣannien, *comme si vous aviez du blé.*

Ganniense, R. *dérober du blé.* Il se dit aussi de toute autre chose semée, comme fezoles, citrouilles, etc.

Ganniehon, Ch. *aller ceuillir des chataignes.*

Kannien, extra comp.
Ganniensera, in comp. } *batte feu.*

Jatente ȣagennienserajen, *je n'ai point de batte feu.*

Ganniegarannie, *frotter entre ses mains 2 bois pour faire du feu.*

Gannienton, Ch. *venir demander q. chose; avoir quelque raison d'entrer chez quelqu'un.*

Θennon senniente? *Qui t'amene ici?*

Onnienta, *jambe.* Agennientarig erhas, *un chien m'a mordu à la jambe.*

Gannienθarhon, *bander fusil*, Ch. Gannienθaragȣan, *le débander.*

Onnienskȣire, *branche d'arbre.*

Onniera, *le dedans de la noix.*

Gannieratakȣan, Ch. *le tirer de dedans.*

Onnierágon, *O que le dedans de la noix est bon!*

Ganniero, Ch. ros, ro, ronne; *pécher au petit poisson avec un panier.*

Gannieton, in comp. *donner commission.*

Garihȣannie^c^ton, R. θas, t, tanne.

Atinnie^c^ton, Ch. *donner charge.*

Atrihȣannieton, Ch. *idem.*

Etkatrihȣanniet neȣagnagren, *je donnerai commission au cas que j'en aie beaucoup.*

Kannigat, extra comp.
Kannigata, in comp. } *une pile*, S. Ronnigataien, *il a une pile.*

Gannigatonni, Ch. *en faire une.*

Gannigatiagon, Ch. *la couper.*

Tagennigatiaχe, *Viens me couper une pile.*

Onnigensa, *cheveux des femmes pendants derrière.*

Tagenniastren, *lie moi ma queue.*

Gannigenteron, Ch. takȣe, tag; *homme de* 35 *à* 40 *ans.*

Rannigenteronseraksen, *chétif homme.*

Onnigȣensa v. Gannegȣe, *sang.*

Jaten te gannigȣensentas te hoñannentsaȣeston, *le sang ne s'arrête pas où l'on la saigné.*

Gannigȣensinnigeñon, Ch. *le sang sortir.*

Gannigȣentsoron, neut. S. *estre sali de sang.*

Gannigȣensohare, Gannigȣensageȣennion, Ch. *laver de sang.*

Onnigȣenta, *la panse, le ventre.*

Onnigȣentara, *rouge.*

Kannigȣati, Ch. *gauche.* Sannigȣati, *il est gauche.*

Kannigonron, *pointe d'une enclume.* Ils nomment ainsi un cochet, parcequ'il a le museau ainsi fait.

Kannigonron, S. *couvrir le temps, ne dire mot de dépit; f.* re.

Kannigotstiagon, Ch. *baisser la tête de honte.*

Ganniharon, inusit, sed ejus loco Atonniharon.

Gannikon, Ch. kons, kon, konne; *coudre.*

Gannikonse, R. Atennikon, pass. Ch.

Gannikonsiongȣan, Ch. gȣas, go; *découdre.* Atennikonsiongȣan.

Gannikonkon, Ch. *coudre avec quelque chose.*

Tagroñaron jontennikonkȣa, *donne moi une aiguille.*

Ganni v. **Ganniha**, *être père, avoir pour père.*

Raganniha, *mon père.* Hianniha, *ton;* ronniha, *son.*

Dicunt Ragenni in vocat. v. subjungunt genha. Raȣenheion sagȣanni genha, *notre père est mort.*

Gannisen, *avoir un père;* takȣe, tak.

Jate ronnisen, *il n'a point de père; il est incertain, on le desavoue.*

Ganninnon, R. *traiter, acheter de quelqu'un;* nons, non, nonre.

Ganninnon, Ch. act. componitur cum omnibus fere substantivis.

Ganneganninnon, *traiter de l'eau de vie.*

Gasiranninnon, *traiter de l'étoffe.*

Atahianninnon, Ch. *traitter des fruits.*

Gahianninnon, R. ȣagonjasaranninnonre, *je viens te traiter un couteau.*

Atenninnon, pass. Ch. *traitter.*

Atenninnonseragon, Ch. *aimer à traitter.*

Atenninnonsera, *traitte, vente.*

Ganninnonse, R. acq. *traiter pour quelqu'un.*

Tagȣanneganninnonsere (nniha), *Va traiter de l'eau de vie pour moi.*

Ganninnonton, Atenninnonton, Ch. *acheter avec quelque chose.*

Gandigon^cra, *esprit, pensée,* S.

Gandigonrio, *avoir l'esprit bien fait,* Ch. R. S.

Gandigonrȣannen, S. *avoir grand esprit.*

Gandigonraȣihon, S. *savoir bien quelqe chose.*

Gandigonrat v. Gandigonret, S. *avoir de l'esprit;* takȣe.

Gandigonraton, S. *avoir perdu l'esprit.*

Gandigon^crata, R. *donner de l'esprit.*

Gandigonroge, S. *être beste.*

Gandigonrhatannion, R. *tromper quelqu'un.*

Gandigonrare, S. *penser à quelque chose;* rarakȣe, rag.

Gandigonriagon, S. neut. *perdre espérance.*

Gandigonriaktanni, R. *f.* ten; *faire perdre espérance.*

Gandigonragennion, R. *surpasser quelqu'un en esprit.*

Gandigon^craχahon, S. *joindre ses pensées, ses opinions.*

Gandigon^craksaton, R. *gaster l'esprit à quelqu'un, le fâcher.*

Gandigonraȣenrion, S. *esprit se brouiller, varier.*

Gandigont, *avoir de l'esprit*; takȣe, tag (rarum usit. nisi in comp).
Gandigontarion, R. *appaiser quelqu'un.*
Gandigonkennion, R. *tromper quelqu'un.*
Gandigonkenheion, Ch.

Gandigonrheñon, S. ens, en, ensere; *s'oublier.*
Garihȣandigonrheñon, S. *oublier une affaire.*

Gannigonhare, S. *bretelles.*
Gandigonharagete, Atendigonharagete, *porter bretelles,* S.

Gannihare, *jusque là.*
Ganniharhon, Ch. hos, ho, hosere; *aller jusqu'à un terme.*
Tsonnontȣann nahanniharho, *il a compris Tsonnontȣan.*

Gannihen, R. *prester.* ȣagonni, *je te preste;* tagni, tagȣanni.
Gannihase, R. *emprunter de quelqu'un;* ȣgonjenniase.

Gannio, *germer,* S. impers. Tontajonnio, *elle a repoussé.*

Gannio, R. *passer la rivière dans un canot.*
Tagȣannio, *passe moi la rivière.*
Gannioho, *aller passer quelqu'un.*

Gannion, S. *avare, chiche.* Rostarokȣannion, *il est avare de rassade.*

Kanniogȣa, *cramaillere.*

Ganniong, Onnionsa in comp. *nez, muffle.* ȣagennionge, *à mon nez.*
Kannionsaȣeston, S. *avoir le nez bûché par un rhume.*
Skannionsa, Skannionsȣann, *orignal.*
Tȣatkonniokon, Ch. *faire la nazade.*
Kannionkon, S. *pns.* et *f.* ka; *saigner du nez.*
Ti agotkonniaeston, *Nez Percés.* 1ae conj.

Kannionra, *trou de la cheminée.*
Kannionragarenton, *la où est le trou de la cheminée.*
Kannionraȣerhon, Ch. *boucher le trou de la cheminée.*
Tagennionraȣerhos, *bouche moy le trou de.* R.
Kannionraȣeragȣan, Ch. *le déboucher;* gȣas, go, gohe.

Onniongȣar, *épine, ronce.*

Gannioron, Ch. *pns.* et *f.* re, *n.* resere; *aller en canot.*
Gnioresere, *je dois aller en canot.*

Gannioron, impers. pass. *f.* rog; *la neige se pressera, s'abbaisera.*

Ganniont, θa, tan, tanne; act. plerumq. comp. *attacher, suspendre.*
Garihȣanniont, Ch. *joindre une affaire.*
Sasarannionton, *attache, pends ton couteau.*
Snatsionnionton, *pends la chaudière.*
Ganniontagȣan, Ch. *détacher, dépendre.*
Ganniontase, R.

Ganniot, Ch. θa, t, tanne; *être planté droit, dresser, mettre debout.*
Sniôten, *dresse,* v. g. *ce pieux.*

Onniòsk, *cayeux.* Gannionseronni, Ch. *faire un cayeux.*

Ganniron, *être fort, dur.*
Gannonsanᶜniron, *cabane dure forte.*
Gannironse, neut. acq. S. Ongnironse, *je le trouve dur.*

Ganniraton, Ch. *affermir;* θa, t, θe.

Gannirhaon, S. *pns.* et *f.* rha; *s'affermir, s'endurcir.*

Ganniseg8an v. **Gannisk8an**, Ch. k8as, ko, kohe*; différer, délayer.*

Ranniseg8as tiotkont kanniga ires, *Il est toujours lent quelque part qu'il aille.*

Ganniseg8aton, Ch. *différer pour ou par q. c.*

Gannisten, *avoir pour mère.*

Gannistensen, *avoir une mère,* R. Gannistensera, subst.

Gannistigar8t, Ch. θa, ten; *faire un boucle.*

Gannistiagéon, S. ges, ge; *pisser.* Est R.

8ahiannistiage, *il a pissé sur toi.*

Gannistiageston, S. *lieu où l'on pisse.*

Gannisterohon, Ch. *Danse des Agoianders où l'on donne de la porcelaine aux spectateurs.*

Onniste, *la queue, le pecoul d'un fruit.*

Garoñare te jonnistonte, *un clou.*

Gannitenton, *Battre sur les écorces le soir qu'on a brûlé ou tué quelque prisonnier, pour chasser l'âme du défunt.*

Onnitskera, *crachat,* extra comp. Oskera, in comp.

Ennitskerontion, S. *cracher.*

Ennitskerontiense, R. *cracher sur quelqu'un.*

Gaskeroserhon, *mouiller de crachats,* R.

Onnitseh8a, *la pance, le ventre.*

Gannitseho, *avoir gros ventre,* S.

Kennihonnitseh8agarate, *il a le ventre gros comme celà.*

Kannitsehoren, S. *la pance se fendre, crever.*

Gannitsok8aron, S. *avoir de la grosse gale.*

Ganno, *froid.* Onneganno, *eau froide.*

Gaiatanno, *corps froid.*

Gaiatannoston, S. *s'affraichir, prendre le froid.*

Kannogariagon, S. *avoir mal aux dents.*

Onnog8a, *blé mangé par les souris.*

Onnog8ario, *farine épaisse détrempée dans l'eau froide, ou blé à demi cuit qu'on écrase ou pile, et que l'on mange sans autre assaisonnement.*

Gannog8ari, S. ris, risere; *se faire un manger de cette sorte.*

Ohare, in comp.; Gannohare, extra comp. *laver.*

Gannatsiohare, Ch. *laver la chaudière.*

Gannohareton, Ch. θa, t, θe; *laver avec quelque chose.*

Gannôha, R. *être oncle :* Ragnoha, *mon oncle;* Hiannoha, *ton oncle;* Ronnoha, *son oncle;* Aχinnoha, *nos oncles.*

Gannohon, impers. *blé raffiné dans la boue qui sent un peu.*

Gannok8a, *une grenouillere, eau de pluye qui a fait comme un marais.*

Eθo 8age si tgannok8ajen, *je vais à la gren.*

Gannok8anneron, *lier un sac, un bourse.* Ch.

Gannok8ason, Ch. *ramasser par ci par là;* k8as, k8a.

Gannontarannok8ason, *manger de la sagamité par cy par là dans les cabanes.*

Onnokȣisen, extra comp. } *farine épaisse.*
Onnȣkȣisera, in comp. }

Gannokȣiseragon, Ch. *en manger.*

Gannokȣiserôon, Ch. *faire de la farine épaisse, sagamité.*

Gannokȣiseroken, Ch. *en faire de quelque chose.*

Gannokȣiseroserhon, *la détremper dans l'eau froide.*

Tagnokȣiseroseras, *détrempe moi de la farine.*

Ongnokȣiserasti, S. *je suis pris au gozier de la farine.*

Gannoña, *fonds de l'eau.* Gannoñagon, *au fond.*

Gannoñagon, Ch. ks, g, χe; *avoir envie de manger*, Ch.

Garihȣannoñagon, Ch. *avoir envie d'une affaire*, seu *chercher querelle, attaquer le premier.*

Gannongȣentaon, R. *brûler les cabanes*; tas, tahȣe.

Θorie rotonni saonχinnoñgȣentaȣe onseronni, *il naquit lorsque les Français bruslerent nos maisons.*

Onnongȣira, S. *corde de porcelaine.*

Θo nigannongȣirage, *combien de cordes de pourcelaine.*

Gannongȣirontion, S. *jetter une corde de porcelaine.*

Gannonhȣaktannion, S. nisk, ten, nire; *avoir mal.*

Jonnonhȣakte, *cela est douloureux.*

Gannonhȣaktáton, S. *causer la douleur.*

Atatnonhȣaktáton, Ch. *se causer de la douleur.*

ȣagnonhȣaktannik, si, sonnhe; *je t'aime, ta vie m'est précieuse.*

Gannonhȣéon, Ch. hȣes, hȣe, hȣenne; *aimer quelqu'un ou quelque chose.* Est R.

Gandigon^c^rannonhȣéon, R. *aimer le naturel de quelq.*

Onnonhȣara, *la cervelle*, S.

Gannonhȣara^c^ton, S. *être ivre, avoir perdu le cerveau.*

Gannonhȣara^c^tonton, S. *ce qui enivre.*

Gannonhȣariaχon, Ch. *casser le cervelle à quelqu'un.* Est R.

Gannonhȣariagon, S. *avoir mal à la teste.*

Gannonhȣariakton, R. *causer mal à la teste à quelqu'un.*

Onnonhȣárore, Onnonhȣarorotseron in comp. S. *bonnet.*

Gannonhȣaroron, S. *avoir un bonnet* seu *la tête couverte:* a Garoron, *couvrir*, et Onnonhȣara.

Atiataȣit gannonhȣarorotseront, *capot qui a un bonnet, capuchon.*

Gannonhȣarata^c^kȣan, Ch. *tirer la cervelle.*

Kannonhiannion, S. nisk, ni; *avoir peur, être effrayé, apprehendre.*

ȣaθonninhianni ȣasagaonnhet te hoñagonhen, *Il a eu peur, il a donné la vie a son esclave.*

Kannonhianniton, S. *causer cette frayeur.*

Kannonhȣeron, R. *saluer quelqu'un;* ronsk, ron, ronne.

Kannonhȣeronton, R. *saluer, remercier par q. c. ou pour.*

Onnonhȣeri, *poil qui croist sur le corps.*

Atnonhȣeronnion, S. pass. *avoir du poil, estre velu.*

Kennihonnonhȣéres, *il y a du poil de cette longueur.*

Gannonhsarori, S. *Chanter chanson de mort ou autre, pourvu qu'on chante seul sans qu'aucun réponde.*

Gannonhsaroriáton, S. *chanter telle chanson.*

Gannonhsarorige, *dans la tabagie où l'on s'entredemande ses desirs.*

Jonnonhsarorigsanni, dit on d'une coureuse.

Gannonhsaroriase, *le faire pour quelq.; aller courir et demander le desir d'un autre.*

Gannon^{c}karon, R. *p.* rons, *f.* re; *faire les cheveux.*

Gannon^{c}karáton, Ch. *avec quoy on coupe les cheveux.*

Gannonkse, R. *avoir pour parent.*

Songsannon^{c}kse Jesss saonχiserase, *Jésus nous adopte pour ses parents quand on nous baptise.*

Gannonksarita, *cheveux brouillés*, S.

Gannon^{c}ksaritagenrat, *chevelure blanche.*

Jonnon^{c}ksaritaksen, *injure.*

Onnonkseñonte, *épi de blé.* Gannonkseñagon, Ch. *manger des épis.*

Onnon^{c}ksat, S. *médecine.* Onnonksatsera, in comp.

Gannonksatserannhonθon, R. *donner médecine.*

Onnon^{c}ksis, *cheveux.* Onnon^{c}ksisere, in comp.

Gannonksiseras, *longs cheveux.*

Gannonksiserare, R. *arracher les cheveux.*

Gannonna (est etiam R.), Ch. *impf.* nakse, *f.* ne, *n.* nanne; *garder.*

Gannatannonna, Ch. *garder le village.*

Garihsannonna, Ch. *garder, attendre le succes d'un affaire.*

Gannonnannion, *avoir envie d'aller au quelque lieu; avoir pour but de son voyage.*

Gannonnatanni, *faire venir l'envie de q. c. en la montrant.*

Onnoñsera, S. *citrouille.* Gannonserajesen, *grosse citrouille.*

Gannoñonsero, Ch. *en faire bouillir.*

Gannoñonseront, Ch. *en faire cuire sous les cendres.*

Gannoñonserontanni, R. *f.* θas.

Atnonoñseront, pass. Atnononserontanni, pass. acq.

Gannonnasan, S. *calumet.* Gannonnasenta, in comp.

Jaten te ssagnonnasentajen, *je n'ai plus de calumet.*

Gannonnatanni, *faire venir l'envie de q. c. à quelqu'un;* R. *f.* ten.

Gannonsajenton, Ch. θà, t, tanne; *tenir la foire.*

Gannonsireton, S. *se perdre, s'abîmer, disparaitre.*

Garihsannonsireton, S. *qui.. r le soin des affaires.*

Gannosen, S. *menteur, estre menteur.*

Gannosenton, S. *mentir;* θa, t, tanne.

Atennosenton, R. *dementir quelqu'un.*

Gannosentanni, *faire mentir quelqu'un; lui attribuer ce qu'il n'a pas dit.* R.

Gannoñsensera, *gueuserie.* Gannonsenseraksenha.

Gasatennonsenserinnet, *que ta gueuserie s'en aille.*

Gannonsa, *cabane.* Gannonsȣt, *il y a une cabane;* takȣe, tak.
Gannonsȣton, *il y a des cabanes.*
Onneneja gannonsȣtakon, *maison de pierre.*
Gannonsogeronte, *maison, cabane dont le toit est en talus.*
Gannesonni, *cabane, ronde par le bout.*
Gannonsonni, Ch. *faire une cabane.*
Gannonsonnianni, R. *f.* nien.
Gannonsison, Ch. *achever ou avoir achevé la cabane.*
Gannonsisaanni, R. *f.* sas.
Gannonsanneron, Gannonsannikon, Ch. *accommoder, recoudre la cabane.*
Gannonsarïsion, Ch. *la défaire.*

Onnonra, S. *chevelure.* Kannonra^{c}kȣan, R. *enlever la chevelure.*

Gannonrare, Ch. *avoir chance au jeu tout blanc ou tout noir.*

Gannonre, S. *avoir gisté, couché en chemin.*
Ka nisannonre^{c}kȣe? *Où as tu couché?*

Gannonsen, R. *marquer sur le corps avec la pointe d'une aiguille.*
Atnonsen, S. *être marqué.*

Gannonsen, R. *f.* enhas; *faire cuire de la viande pour quelqu'un.*

Gannonste, R. *impf.* tekȣe, *f.* teg; *aimer.*
Gannonstaton, in comp. *garder, protéger.*
Gaiatannonstaton, R. ts, t, θe; *garder quelqu'un.*
Gannonstati, R. *f.* ts, tatseg; *refuser à quelqu'un.*
Jonχinnonstati ajagȣatenti, *on nous a empêché de partir.*

Onnonta, *lait,* S.
Gannontat, *il y a du lait.*
Gannontatata, *se faire venir du lait.*
Gannontatakȣan, Ch. *tirer la lait,* v. g. *à la vache.*
Gannontat^{c}kaon, C. kaȣas, kaȣa, kaȣasere; *quitter la mammelle.*
Gannontakȣion, S. *estre saoul de teter.*
Gannontonte, *elle a des mammelles formées.*

Onnontara, *sagamité.*
Gannontario, Gannontaragon, *bonne sagamité.*
Gannontaragasθa, Ch. *qui mange beaucoup de sagamité.*

Onnonte, *montagne.*
Onnontes, *longue ou haute montagne.*
Onnontagenhiat, *au dessus.* Onnontoharage.
Gannontaráon, Ch. ras, ranne; *monter.*

Gannontégon, Ch. ks, g, kse; *boucher, fermer quelq. vaisseau ou quaisse.*
Gannontekton, Ch. *le boucher avec quelque chose.*
Gannonteksion, Ch. *le déboucher.* Gannonteksions^e.
Atnonteksion, pass. Ch. *se déboucher.*

Gannonten, R. tens, ten, tenre; *donner.*

Gannonton, inusit. In comp. *fouiller, interroger.*
Garihȣannonton, Ch. *demander de nouvelles;* tons, ton, tonre. Est etiam R.

Garihȣannontonre, *je te viens interroger.*

Rarihȣannontonskon, *curieux, grand demander de nouvelles.*

Gannonton, Ch. *s'ennuyer, s'impatienter d'attendre quelqu'un ou q. c.*

θosa tesennontong nastennháon, *Ne t'impatientes pas en attendant ce que tu m'as commandé de faire.*

Gannonton, Ch. tes, te, tesére; *jetter de la porcelaine pour les morts.*

Gannonteton, Ch.

Gannontráon, R. *attraper quelq. après qui l'on court, l'atteindre.*

Onne ȣagonnontranne, *je t'ai atteint;* tras, tranne, trasere.

Gannontraseron, *de multitud.*

Onnontsi, Onnontsista in comp. S. *tête.*

Gannontistagarien v. Gannonkarien, *manger la tête.*

Onnora, S. *tresse de blé.*

Gannoronni, Ch. *tresser le blé.* Gannoronnianni, R. *f.* nien.

Gannonrarhon, *les mettre sur les perches.*

Asen nagonnoron, *je te donne 3 traisses.*

Neθo nigannorage tsinni jeȣendage ahetȣannorarorog hatitsihenst, *Donnons autant de tresses de blé, qu'il y a de voix aux robes noires.*

Gannóron, Imps. *être difficile, prétieux,* S. rong.

Gannoron^c^kon, Ch. *pns. & f.* kȣa, kȣag; *n.* kȣanne, *estimer q. chose, la faire précieuse.* Est R.

Jatan te sknoron^c^kȣa, *tu ne fais pas cas de moy.*

Garihȣannóron, *chose d'importance.*

Gannonsandóron, *cabane où l'on a peine à entrer.* S.

Gandoronnaon^c^tenti, *il y a de la peine à marcher.*

Atennoron^c^kon, S. *être rendu difficile, de prix par q. c.*

Gannonron^c^kȣanni, R. *f.* kȣen; *faire q. c. prétieuse, chère.*

Gannoron^c^kȣaton, Ch. *le faire chèr pour celà.*

Gannoronse, neut. acq. S. *trouver difficile;* rons, rons, ronsere.

Ongrihȣannorons nagrihȣiost, *Je trouve difficile d'être Chrétien.*

Gannȣsen, R. sas, sa, sasere; *porter envie.*

Gannȣsen, Gannȣsenha, *beaupère.* Sagonnȣsenha, *son beaupère.*

Onnȣsera, *galle.* Gannȣseraon, S. sas, sa. Gannȣserarhon, R. *la donner.*

Onnȣta, *coton, duvet.*

Nondȣtage^c^te, *la guerre.* Hotinnondȣtagatete, *les soldats.*

Onne tetsiongiatógen nondȣtagete, *J'ai fait divorce avec la guerre.*

Kannotoñagon, Ch. *avoir les dents agacées.*

Onnotsia, *dent.*

Areko ronnotsiȣt, *il n'a pas encore de dents.*

Kannotsiongo^c^ton, S. *avoir mal aux dents;* θa, t, tanne.

Kannotsiotagȣan, Ch. *arracher la dent.*

Kannotsiotagȣanni, R. *f.* gȣas.

Gannotsiotarhon, *avoir quelque chose entre les dents.*

Tȣannoserigon v. Tȣannogaranniehon, *grincer des dents.*

Gan^c^dȣton, Imperson. S. *être profond.*

θo nijon^c^dȣtes, *Combien est-il profond?*

Ken ni ondȣtesons, *Il est de cette profondeur.*

Ken ni onᶜdȣtesa, *un peu profond.*

Ganᶜdȣton, Neutr. acq. S. *être profond à quelq.;* tons, ton, tonne.

Ongȣennȣton si etiagȣenniat, *Nous avons trop d'eau là où sont nos nasses.* Intrat in comp.

Kenniȣenheiontandȣtes gagerontatie, *Il y a des corps morts de cette hauteur.*

Ken ok tsionᶜdȣtes, *Il n'y a plus que cette hauteur,* v. g. *dans le baril.*

Gar et gare, *être, mettre dessus, peindre, paraître.*

Composita ex gar, *être, mettre dessus.*

Jaten te garihȣare niotaksen nongȣarihȣiostaᶜkon, *Il n'y a rien de mauvais dans notre créance.* Vel Jaten te gare garihȣaksen.

Garaton, act. *mettre auprès non pas immédiate.*

Okniorea te srat, *Mets ces deux choses près l'un de l'autre.*

Garon, pass. *mettre près, après.*

Joskenhen sron, *mets près après,* v. g. *ces graines.*

Atron v. atren, *être à quelque distance;* trons, trons, tronne, tre.

Joskenhen ate tȣatre, *Sumus proximi.*

Kene nate giatréa, *Ces deux choses sont l'une contre l'autre.*

Ok niore ken niorea, *tout près.*

Garagȣegan, Ch. *effacer;* geȣas, geȣe, geȣasere : fere semper cum nota reitere, Garageȣenni, R. *f.* geȣas, *effacer à quelq.*

Onsahagrageȣas nagrihȣanderen, *Il m'a effacé mes péchés.*

Atrageȣen, pass. *s'effacer, se décolorer.* Atrageȣenni, pass. recip.

Atrageȣaton, *θa, ce quoi avec on efface.*

Sȣatrageȣaθa niagȣarihȣanderask Jesȣs raonnigȣensta, *Ce qui fait effacer nos péchés, c'est le sang de J. Christ.*

Garonnion, ons, on, onne; *Y avoir par ci par là.*

Garihȣaronnio njojandere, *Il y a par ci par là q. c. de bon.*

Gar, cum partic. motus atie signat *aller avec q. c., l'accompagner, se faire avec ou en même temps.*

ȣaseraratie sinni ȣenniseres, *La hache frappait tant que le jour dura.*

Garihȣaraties, *l'affaire va, suit en même tems.*

Jaten te jondegorharation onne jagoiateñon jonhȣentsiagon, *La porcelaine n'est pas allée en enfer avec ceux qui y sont.*

Garaᶜkon, Ch. kȣa, *f.* kȣe, kȣanne; *mettre dans q. c.*

Naie ensrakȣe, *tu mettras la dedans.*

Ontakne tsnirakȣe, *mettes dans la chaudière.*

Hoñajatarakon garontotserage garistatsi, *On le mit dans un cercueil de métail.*

Garaᶜkon, *estimer, priser.* R.

Jaten te θariakȣa, *Il ne t'estime pas.*

Jaten χetarakȣa onseronni, *Je ne crains, ne fais point de cas des Français.*

Gaȣennaraᶜkon, R. *obéir;* kȣa, kȣe, kȣag, kȣanne.

Atȣennarakon, pass. *être obéissant.*

Atiatarakon, Ch. *se plaire à q. c.; être tout la dedans.*

ȣagatiatarakon nondȣatagete, *Je me plais à la guerre.*

Hennegen hetsegonsarakȣat, *Fais luy mettre la face en haut,* ut solent facere aliquid sorbentes.

Garakȣanni, R. *f.* kȣen, *mettre à quelq.*

Ontakne tagrakȣen, *Mets moy à manger dans la chaudière.*

Garanni v. Gatsientanni, R. *f.* rhas, *mettre à manger pour quelq.;* nik, nire.

Tontagerhas, *redonne m'en encore.*

Gàragȣan, Ch. gȣas, go, gohe; *ôter de dedans, trier, choiser;* srago, *choisis.*

Garihȣarágȣan, Ch. *avoir égard à q. c.,* dite par mégarde.

θosa tesrihȣarágo hoθennon ȣairon jagonnegiren, *N'aye pas égard à ce qu'on dit dans l'ivrognerie.*

Atiataragȣan, Ch. *s'ôter, se retirer de q. c.*

Gaiataragȣan, R. Hetsiarago rokskoña, *descends cet enfant de dessus.* Signat etiam *choisir quelq.*

Atrihȣaragȣan, *une chose se retirer, n'y penser plus* : a Garagȣan, *descender q. c., l'ôter de dessus.* Vide infra Gahre.

Aθaragȣari, Ch. *s'ôter du chemin, se détourner.*

Aθaragȣanni, R. *f.* gȣas, *se détourner pour laisser passer un autre.*

Garáon, R. ras, ranne, rasere; *trouver quelq.*

Aχerasere jagoiengȣiron, *Je vas trouver ceux qui sont à la chasse.*

Gannontaráon, Ch. *monter une montagne.*

Tȣatráon, Ch. tras, t-ranne, t-rasere; *se rencontrer.*

ȣaθontranne, *ils se rencontrèrent.*

Tȣat-raseron, Ch. *de multis.*

Tȣat-raton, Ch. *faire rencontrer;* θa, t, tanne.

Ateráton, Ch. *passer.* Ateráton, *mesurer.* Ch.

Asen nahátérat honajengȣanninnons, *Il donne 3 longueurs de tabac.*

Garaon v. **Garaȣi,** R. *habiller, couvrir quelq., calumnier, accuser.*

Jotsannit naongras! *C'est étrange qu'on m'impute celà!*

ȣagonras, *je te couvre.*

Garagaraȣi, Garagarhon, R. *accuser, quereller quelqu'un.*

ȣaχeragarhosera v. ȣaχeragaraȣire, *je m'en vas quereller.*

J. ejongȣarihȣaranne, *l'affaire tombera sur nous.*

Garáon, act. *vouloir, consentir.*

Jaten horas, *Il ne veut pas consentir.*

Onne ȣahatiranne rotiksten, *Les anciens consentent, il font le cry d'approbation, le* Niohen.

Garase, R. *f.* ras, *consentir à quelqu'un.*

Onne gonrase, *J'approuve ce que tu.*

Gaȣennaráon, Ch. *avoir vu en songe.*

Gaȣennaragȣan, R. *parler en faveur de quelqu'un qui demande ses desirs dans L'*onnonhȣarori.

Gar, *paraitre, reluire.* Imp. garakȣe, *f.* garag.

Onne igar, *le soleil luit.* Ason tegar, *la lune n'est.*

Onne iskar, *nous avons nouvelle lune.*

Entiek négárák, *à midy.*

Atra, pass. Esȣatrat, *quando erit nova luna.*

Onne tsiọt ragarhon, *en nova luna.*
Onne sȣa-traθe, *la lune va renouveller.*
Atraton, neut. sumpt.
Areko tetsiongȣat-ráton, *Nous n'avons pas encore nouv.*

Gar, cum part. kon.
Ken nongati garakennen, *le soleil étant au dela de midi.*

Garakȣa, *le soleil.*
Garakȣannontakton, Ch. θa, t, tanne; *attacher le soleil.* Ab Oraᶜkȣannentágon, quod sæpius pro sole simplicitur usurpatur.
At-takȣaton, *Impson.* Onne ontrakȣaton, *nous avons éclipse.*
Garakȣt, *Imp.* takȣe, ten, tanne; *faire bien chaud.*
Taonχen jorakȣt, *O qu'il fait chaud!*
Garakȣatatou, S. *le soleil être piquant, ardent.*
Garakȣatiron, Ch. *le rayon du soleil passer en quelque lieu.*
Garakȣinnion, cum part. loc. *le soleil passer au travers,* v. g. *une vitre.*
Garakȣinnegeñon, ens, enne, enhȣe; *le soleil se lever, sortir de la nue.*
Garakȣaȣiaχon, Ch. *aller à la chasse des tourtes la nuit.*
Karakȣaȣerhon, Ch. *être, se mettre à l'ombre.*
Garakȣaȣerhoston, *faire de l'ombrage.*
Atrakȣaȣerhoton, Ch. *se mettre à l'ombre.*
Jagotrakȣaȣerhosθa, *un parasol.*
Tȣatronrose, S. *être ébloui du soleil.*

Gar et **Gare,** *peindre.* Gaiatare, *peindre quelq.* R. re, ren, ranne.
Tagiataren, *peinds moi.* Gaiatare, act. *peindre.*
Gaiatare, pass. Eθo rajatare Jesȣs, *Voilà l'image de J. C.*
Hatiataronnion hotiatatogeton, *les images des saints.*
Onka ken gaiatare, *De qui est cette image.*

Gar, *être, mettre du nombre;* re, rag, ranne.
Ja nennạie se gar, *Cela n'est pas compris.*
Naie onni igar, *Cela y est aussi compris.*
Gaiatare, Ch. *estre du nombre, être présent.*
Esiatarag n'egatennioten, *Tu assisteras à mon festin.*
Gaientare, *comprendre, faire cas.*
Jaten te gaientareha ȣaontatsiararágo, *Cela n'est rien, qu'on arrache les ongles.*
Jaten te χeintarha areko jagorihȣioston, *Je ne comprends pas les infideles.*

Gaiataratie, *aller en la compagnie de quelqu'un.*
Ehojataratie, *il est allé en la bande,* v. g. *des guerriers.*

Gaiatarágȣan, R. gȣas, go, gohe; *ôter du nombre, excommunier.*
Satiatarágo, *retire toy de cette compagnie.*
ȣahoñajatarágo notiokȣatogetonge niagorihȣioston, *On la ôté du nombre des Chrétiens.*

Gahre, rakȣe, rag; *être, mettre dessus.*
 θo gaksahre, *le plat est la dessus.* Vide sup. Gahre.
 Ennisne gahra^{c}kȣe, *Cela était sur l'andichon.*
 Gaiatahre, *une chose vivante être dessus.*
 Atiatahre, Ch. *se mettre dessus quelque chose.*
 Ga^{c}ráon, *tomber dessus;* ras, ranne.
 Onksiraranne, *du feu est tombé sur moy.*
 Enniserage agaiataranne tsinnoȣen, *La souris est tombée sur l'andichon.*
 Gara^{c}gȣan, Ch. *ôter de dessus;* gȣas, go, gohe.
 Snatsiahrágo, *ôte la chaudière de dessus le feu.*
 Garagȣanni, R. *f.* gȣas, *ôter de dessus à quelqu'un.*
Garagohon, Ch. *aller quérir de nids de tourtes.*
Ga^{c}re, re, ranne, rasere; *monter en haut.*
 Agannonsaranne, *la cabane va montant en haut.*
 Eθa tagan^{c}negaranne si etiontiatannhasθa, *L'eau monte jusqu'à la ceinture.*
Gahre, re, ren, ranne; *mettre, lever en haut.*
 θosren, *mets là dessus.* ȣakren, *j'ai mis.*
Gahráon, *f.* has, R. *mettre dessus pour quelqu'un.*
 Tageksagerhas, *mets moy le plat la dessus.*
 Tagientaherhas, *mets moy ce bois sur ma charge.*
Gaharatáton, Ch. *lever en haut;* ts, t, θe.
 Sagenharatat, *trousse ta robe.*
Gahren, *le coup tomber sur quelqu'un;* ras, ra, ranne.
 Jaȣetȣan ȣaonkranne, *J'ai reçu quantité de coups.*
Garagarere v. **Garagarhe**, *imps.* S. *faire du bruit.*
 Gannakȣagareraston, Ch. *jouer du tambour.*
 Garistagareraston, Ch. *sonner la cloche.*
 ȣahotakȣarere, *ses souliers font du bruit.*
Garahiatakȣan, R. kȣa, kȣe; *agacer, irriter.*
 Atrahiatakȣan, Ch. kȣa, kȣe, kȣanne; *refuser de faire q. c.*
 Atrahiatakȣanni, R. *f.* kȣen, *refuser à quelqu'un.*
Garannie, es, e, ese; *frotter.*
Garagenrje, R. jes, e, jehe; *rouler, volutare.*
 Otsirege hoñaragenrie, *On l'a roulé dans le feu.*
 Atragenrie, pass. Otonkȣagon jonr-ragenriehon te jagotonnhakarien jonhȣentsiagon, *Les damnés se roulent dans les flammes.*
Ga^{c}rarágon, Ch. raks, rag, raχe; *percer, trouer.*
 Ga^{c}rarági, R. *f.* ks. Gararakton, Ch. *trouer avec quelque chose.*
 Jerontararakta, *une tarière.* Jerontararakθa.
Garannaȣan v. **Gannaȣan**, *être humecté, un arbre être en séve.*
Garanniston, Ch. θa, *ne pas écouter.*
Garáta, *talon.* Tagratonnien, *Couds moi le talon de mes souliers.*
Garáte, Ch. tes, ten, tensere; *aller le long de q. c.*
 θo garates tsinnoȣen, *La souris monte le long, &c.*

Tȣaratatou, *courir*, Ch. ts, t, θe. Est R. ȣaθoñaraᶜtat, *on sauta, courit sur luy.*

Garaθen, Ch. θens, θen, θensere; *monter.*
Jeraθensθa, *une échelle.*

Gararhon, Ch. hosk, ho, hosere; *aborder en canot.*
Jeraroθa, *débarquement, lieu où on aborde.*

Garaᶜsen, Ch. imperf. takȣe, sen; *faire cuire dans l'eau.*

Garaskȣa, *portion de sagamité.*
Garaskȣatarihaton, Ch. *la faire rechauffer.*
Garaskȣaȣeron, Ch. *renverser un plat de sagamité.*

Garégon, Ch. rks, reg, rekse; *pousser.*
Setsitareg, *attise le feu.* Jahakrekȣe, *il m'a poussé.*
Garaseron, frequent. Setsistareseron, *attise ces tisons.*

Tȣ–Atatreseron, Ch. *s'entrepousser.*

Kȣatre, *mon petit fils ou p. fille.* In voc. vid. sup. Atrea. χeiatrea, *ma petite fille.* Hiatréa, *mon;* Sagotre ogoña, *ses petits fils.*

Gare, cum redupl. *un nombre au dessus de dix.* Oieri, skat, skare, *onze.*
Ojeri nihati tegni satire, 12 *homines;* tegni skontire, 12 *fœmenæ.*
Componitur cum Gaiata, et dicunt : Asen satiatare, *ils sont douze.*
Ojeri ȣaθagennhongo gaieri skagennhare, *il a passé* 14 *ans.*
Skat tsioserare oieri sané, *onze hyvers.*

Garenda, S. *prière, chanson, festin, sort.*
Rarendio, *sa chanson est belle.*
Garennentáon, Ch. *achever sa prière, sa chanson.*
Atrendagent, Ch. ensk, en, enne; *prier.*
ȣagatrendajentakȣe, *j'avois prié.*
Jontrendajentakȣa, *une chapelle, lieu où l'on prie.*
ȣagatrendajennonnen, *j'étais allé à la prière.*
Atrendajentagȣan, Ch. *avoir prié.*
Atrendajenni, R. *f.* enhas, *prier pour quelqu'un.*
Tagȣatrendajenhas, *prie pour moi.*
Atrendȣt, Ch. θa, ten, tanne; *chanter.* Garendȣt, act. idem.
Atrennonnianni, R. *jetter des sorts; f.* nien.
Garendahetken ȣahorio, *C'est un sort qui le tire.*

Garennhaon, Ch. nhas, nhanne, nhasere; *s'accoutumer.*
Areᶜko rorennhaon, *Il n'est pas encore accoutumé.*
Iotrennhat, *on s'accoutume.* Est R. Hoñarennháon, *on est accoutumé à luy.*

Atrenranni, R. *aimer quelqu'un, aller à quelq. sitôt qu'on le voit.*

Garenha, *cime d'arbre.*
Garenhoskaron, Ch. *ébrancher une arbre;* rons, ron, re.
Garenhoskaronse, R.

Gareñja, *bûche.* Karenjoren, *fendre une bûche.*

Garennhon, R. *scarifier, faire incision;* nhens, nhon vel nenn.
ȣahatatrenn, *il s'est coupé.*
Atattrennhon, Ch. *se scarifier.*

Garensa, *corde de rassade, chappelet, jambe.*
Tagrenson, *donne moy un chapelet.*
Garensannoñagou, S. *avoir mal aux jambes.*
ȣahotrenso, *il a la jambe enflée.*
Garensotari, Ch. risk, ri, riχe; *bander un arc.*
Garensotarision, Ch. *le débander.*
Garentagáron, Ch. rons, re, ronhe; *rechausser le blé.*
Ga[c]**renton** (dic Orenton, extra comp.), *pendre en bas.*
Jo[c]rentonkȣe, *cela pendait en bas.*
Ejorentonhag, *que cela pende en bas.*
Ab Enton, in comp. S. *chose qui pend.*
Joristenton, *du fer qui pend.*
Entonkon, act. *pns.* et *f.* kȣa, kȣanne; *faire pendre, suspendre q.c., descendre q. c.*
Entonkȣanni, R. *f.* kȣen, *faire descendre à q. chose, la dévaler.*
Hennegen ȣaθonasitanneren ok ȣahoñagonsajentonkȣat, *On luy lia les pieds an haut et suspendit la tête en bas.*
Gareȣaton, R. θa, t, tanne; *punir, tancer.*
Atreȣa[c]ton, Ch. *s'opposer à q. chose, la blâmer.*
Ratreȣaθa n'ontredajen, *Il blâme la prière.*
Ionχireȣaθa n'ongȣarihȣioston, *On nous blâme, nous autres;* χens.
Garha, *forest.* Garhio, *belle forest.* Garhasen, *il y a une forêt.*
Garhate, *il y a.* Garhatajenton, *il y a des forests.*
Garhison, Ch. sas, sa, saanne; *faire une forest.*
Garhatageha, *des bluets.* Garhatagentiag.
Garhagonha, *oiseau de proye, vautour.*
Garhit, *arbre de bout.* Potius dicit. Gerhit, gerhitakȣa.
Garhare, Ch. vel S. rekȣe, re, reg; *attendre, espérer.*
Est R. Jesarhare, *on ta attendu.*
Garharaston, Ch. *attendre pour q. chose.*
Garharastanni, R. *f.* ten; *faire attendre, promettre à quelqu'un.*
Jesȣs songȣarharastanni garonhiage, *Jésus nous a promis le ciel.*
Garhate, S. *coureur qui n'arrête en nulle place.* Male sonat, quando dicitur de muliere.
Garhegaton, Ch. θa, t, tanne; *desirer en quelque lieu.*
Gerhegaθa garonhiage, *Je souhaitte le ciel.*
Garhegatanni, R. *f.* ten; *desirer de voir ou d'être avec quelqu'un.*
Ogarhenta, *massue d'armes.*
Garheñon, S. ens, enne, ensere; *être jour.*
Ejorhenne egatenti, *Je partirai demain,* seu *quand il sera jour;*
Oia etsiorhenne, *après demain;*
Orhonge, *le matin;* Orhongetsi, *de très grand matin.*
Garheñon, neut. *arriver au jour.* S.
Oskeronge onsahorhenne, *à peine a-t-il revu le jour.*
Niaȣen Jesȣs oskennen onsajon gȣarhenne, *Grâces O Jésus de ce que nous avons revu le jour.*

Karhenton, Ch. *faire arriver au jour, surpasser tout la nuit;* θa, t, tanne.
ȣaθarhent ȣahotonkȣarho, *Il a eu la fièvre toute la nuit.*
Garhenton, Ch. *citrouilles qui passent la nuit à cuire sous les cendres.*
Ontaterhentannik jontataȣiatanni, *On fait cuire des citrouilles pour ses hôtes.*
Garhentagȣan, Ch. gȣas, go, gohe; *dérober les dites citrouilles, les tirer des cendres.*

Orhesk, *espine.*

Garhon. *berceau.* Garhonsera, in comp.
Garhonne, *être au berceau.* Garhonseronni, *en faire un.*
Garhonseronnianni, *f.* njen
Garhonseronniaton, *le faire de quelque chose.*
Serhonserȣten, *dresse le berceau.*
Eserhonseriennent, *tu feras tomber le berceau.*

Garhon, Ch. *frotter, induire de q. chose;* hosk, ho, hosere.
Gajennarhon, Ch. *frotter d'huyle.*

Karhon, *mettre au jeu.*
Hoθennon te serho, *Que mettras tu au jeu.*

Garhóron, *couvrir, envelopper;* roks, rog, roχe. Est etiam R.
Aterhoron, pass. Ch. *se couvrir, s'affubler.*
Gasa satiataȣit agaterhorog, *Donne moi ta robe que je me couvre.*
Garhoro^c^kon, neut. *être couvert de quelque chose.*
Garhorokton, Ch. θa, t, tanne; *envellopper avec quelque chose.*
Garhoroksion, Ch. *dévellopper, découvrir.*
Aterhoroksion, Ch. *se découvrir;* sions, si, sionhe.
Garhoroksionse v. Garhoroksiongȣanni, R. *déplier à quelqu'un.*

Orhotsera, *la gousse des fezoles.*

Garhotonni, N. nisk, ni, nianne; *addoucir quelq.*

Gari, inusit., *être cuit.* Onne jori, *cela est cuit.*
Ejorihag, *qu'il soit cuit.* Niare egarig, *attends qu'il soit cuit.*
Jaten te garisere, *Non coquetur.*
Gariton, Ch. *faire cuire;* θa, t, tanne.
Garitanni, R. *f.* ten, *faire cuire à quelqu'un.*
Garise, R. acq. *coqui alicui.*
Jaten te gerhe eȣagrisennire, *Je crois que cela ne se cuira pas à moi.*
Jonnorári, *le blé est meur.*
Jesȣs songȣannoraritanni, *Jésus a fait meurir nos bleds.*

Garigon, Ch. ris, rig, riχe; *mordre.*
Jaten tagarig, iaten te skannotsiôt: *Il ne mordra pas, il n'a plus de dent.*

Karigon, *joindre ensemble.*
Te giatqntarigon, *Kébec, deux rivières qui se reunissent.*
Ati sȣendarig sȣaksten ogoña, *Convenite simul et deliberate.*

Kari, *être chaussé.* Garisk, *chausse.*
Garisk oñȣe, *des mitasses.* S. Raorisk, *ses mitasses.*
Garisk te jositonte, *Des bas qui ont le pied.*
Te satri, *mets tes bas.* Garisera, in comp.
Tagriseragȣetare ne sósa, *Coupe moy des bas à ta couverte.*
Garisi onton, *On est reduit à la besace, il ne reste plus rien.*
Garis ȣagatkannonni, *Je ne suis plus rien.*
Tȣatrision, S. *se déchausser.*
Karision, R. *déchausser quelqu'un.*
Kariskaȣe, *aller déchaussé;* kaȣas, kaȣe.
Te horiskaȣe iras, *Il va jambes nues.*

Garienna, *charge de bois.*
Gariennagete, S. *porter une charge de bois.*
Gariennontion, *jeter par terre.* S.

Gariheñon, In comp. *être chaud.*
Atariheñon, pass. S. ens, en, ensere.
Jotarihen, *cela est chaud.*
Joroñaratarihen, *le fer est chaud.*
Atariheñon, neut. S. *avoir chaud.*
Origȣatarihen, *j'ai chaud.*
Garihâton, Ch. θa, t, tanne; *faire chauffer, bouillir*
Snotaratarihat, *faire chauffer la sagamité.*
Garihatanni, R. *f.* ten.

Garihȣa, *chose, affaire, discours, nouvelle,* S. Raorihȣa.
Garihȣio, *bonne affaire, estre bon.* S.
Horihȣio, *il a l'esprit bien fait.*
Garihȣastanni, R. *f.* sen, *tancer quelqu'un.*
Atatrihȣastanni, *se repentir, blâmer.*
Garihȣioston, Ch. θa, t, tanne; *croire, être Chrétien.* Quasi diceres *faire une bonne fortune.*
Garihȣiostackon, Ch. *pns. & f.* kȣa, kȣanne; *croire par q. c.*
Garihȣison, Ch. sas, sa, saanne; *achever une affaire, conclure.*
Garihȣisaanni, R. *f.* sas.
Jesȣs songȣarihȣisaanni sȣat-rageȣaθa niagȣarihȣanderask, *Jésus nous a fait une bonne affaire pour effacer nos péchés.*
Garihokte, Ch. θa, ten, tanne; *conclure son discours.*
Atrihokte, Ch. pass. *une affaire être à son bout.*
Onne ontrihokten ongȣarihȣa genha, *Notre affaire est à bout, est perdue.*
Garihoktanni, R. *f.* θas; *achever une affaire, discours, nouvelle.*
Garihont, *y avoir quelque liaison, rapport entre q. c.*
Jaten te tsiorihont, *Il n'y a plus sujet de, plus de rapport.*
Garihont, θa, ten, tanne; *donner quelque charge à quelqu'un.*
Atrihont, S. in *pnt.* et Ch. in *fut.;* *être officier, capitaine.*
Θone eθotrihontakȣe Konskȣirat ronajatskȣe, *Ponce Pilate étoit alors gouverneur.*
Garihontagȣan, R. *dégrader quelqu'un.*

Garihontakon, *pns. & f.* kȣa, kȣanne; *faire q. c. à dessein.*

Garihȣtaon, Ch. tas, tanne, tasere; *arriver nouvelle.*
Garihȣtase, R. acq. θas, in *f.*
Atrihontagȣan, Ch. *se démettre de sa charge.*
Ejorhenne ejongȣarihȣθas, *Demain la nouvelle nous viendra.*
Garihȣenhaȣi, Ch. *porter l'affaire, apporter la nouvelle.*
Rarihȣenhaȣis Diȣ raorihȣa, *Il porte la voix de Dieu.*
Garihȣeȣe, neut. Ch. *nouvelle être affirmée.*
Atrihȣinneton, Ch. θa, t; *la nouvelle venir de quelque lieu.*
Ganniege tontrihȣinnet, *la nouvelle vient d'Agnier.*
Garihȣasθoton, Ch. *diminuer, amoindrer la chose.*
Garihiagon, *couper la discours*, Ch. ks, g, χe.
Garihiagi, R. *f.* hias.
Asongȣarihias, *Il a coupé son discours pour l'amour de nous.*
Atrihiagon, *rem cessare, n'en parler plus.* Melius dicunt : Onne jorihȣagaion, *c'est une vieille affaire.*
Jorihȣagon, *c'est une bagatelle, nouvelle sans fondement.*
Garihȣanniont, Ch. θa, ten, tanne; *attacher l'affaire, un present.*
Garihȣannageraton, Ch. *faire des affaires.*
Garihȣannhatanni, R. *aggrandir le mal, faire l'aff. plus mauvaise.*
Garihȣa^c^raon, Ch. *avoir attrapé l'affaire;* ras, ranne, rasere.
Garihoteñon, S. *être empêché.*

Gario, *beste fauve.* Gariota, in comp.
Gariotannagre, *il y a bien des bestes.*
Gariotannagȣr, Ch. *être bon chasseur.*
Garotatsannit, *bête monstrueuse.*

Gario, R. os, o, osere; *tuer, battre :* ȣagonrio, *je te tue;* ȣahorio, *il l'a tué;* ȣaχetario, *je tue leur fiante.*
Atrio, Ch. *se battre;* trios, trio, triosere.
Atatrio, Ch. *se tuer soymême.*
Gariose, R. *f.* rios; *tuer à quelqu'un.*
ȣasongkȣannaskȣarios, *Il nous a tué notre animal domestique.*
Atriose, *se battre pour quelqu'un.*

Gario, *valoir, être le prix de quelque chose.*
Θennon jorios sonnonaȣan? *Que te donnera-t-on pour ton calumet?*
Garioton, *tuer, frapper, acheter avec q. c.;* θa, t, tanne.

Garioon, cum reitr. *quelque semence mourir,* v. g. *blé, fezoles, &c.*
Onsajorio ȣagnagȣaton^c^nen, *Le blé que j'avais semé est mort.*
Tsioriosere, *il mourra.*
Gariose, neut. acq. S. Onne tsiongȣariose, *nos bleds sont morts.*
Tsioriöθa, *du blé qui n'est pas venu à maturité.*

Ka^c^rion, Ch. ris, rinne, risere; *s'user, être usé, brisé.*
Te jo^c^rion, *cela est usé; farine bien pilée, brisée, menue comme sable.*
Gajanna^c^rion, S. *être brisé, las, fatigué.*
Karise, R. *f.* ris; *s'user à quelq.*
Te ȣagatakȣarise, *mes souliers sont usés.*

Garira, *corde* (Onnejȣt).

Gacriron, Ch. ris, rire, risere; *répandre quelque liqueur.*

ȣasnegarire, *tu répands l'eau.*

Gacrise, R. *f.* ris. Asongȣannatsiaris, *il a répandu notre chaudière.*

Onχrisehatie, *cela va se répandant sur moy.*

Garicton, *gland, chesne.*

Kacrison, Ch. θa, t, tanne; *briser, rompre.*

ȣatetkrit, *je brise;* ȣatesrit, ȣaθarit.

Oȣaron te gariton, *chair brisée en petits morceaux.*

Karitanni, R. *f.* ten; *briser à quelqu'un.*

ȣatesknatsiariten, *tu m'as rompu ma chaudière.*

Orite, *tourte.* Garitetsera, in comp. ȣasriteserag, *mange des tourtes.*

Garistatsi, *fer, métail;* Garistatsisera, in comp. Garistonni, *en faire.*

Raristonnisk, *armurier, qui travaille sur le fer.*

Garistȣt, *il y a du fer.*

Garistȣton raota, *il a des cloux à ses souliers.*

Garistandóron, *or, argent, métail prétieux.*

Karistiagon, Ch. *battre du blé entre 2 pierres;* ks, g, χe.

Karistiagi, R. *f.* ks; *en écraser pour quelq.*

Oriste, *blé ainsi écrasé après avoir été trempé dans l'eau.*

Garistagon, Ch. *en manger.*

Garo, *en deçà;* regit aoristum.

Garo nagaihoriati, *en deçà du ruisseau.*

Skaihoriati, *au delà du ruisseau.*

Garo nagannatati, *en deçà du bourg.*

Garo gaset, *viens en deçà.*

Garógon, Ch. *bûcher, faire du bois;* roks, rog, roχe.

Kannentsarógon, Ch. *saigner, frapper le bras avec du fer.*

Garógi, R. *f.* roks; *faire du bois à quelqu'un.*

Atat-rogon, Ch. *se frapper avec sa hache.*

Garokton, Ch. *bûcher avec q. chose.*

Garokte, *viste, promptement.*

Garoñare, *fer pointu par un bout.*

Garoñare jontennikonkȣa v. teratakonniaθa, *alêne.*

Garoñare te ȣatroñarongoθa v. garoñaragarent, *aiguille.*

Garoñare te jonnistonte, *un clou.*

Garoñarȣton raota, *il a des cloux à ses souliers.*

Garoñarȣt, Ch. *ficher un clou.*

Garongȣan, *ramasser q. c. répandue par terre.*

Garokȣa, *une pipe, touche de petun.*

Garokȣentaon, Ch. *achever de fumer.* Atrokȣajenton, Ch.

Atrokȣaχahon, Ch. *être assis les uns près des autres, comme en conseil, à cause qu'ils y petunent.*

Tȣatrokȣannegen, Ch. Tegni tetgarokȣentanne jenseȣe, *Tu y arriveras après avoir fumé deux fois.*

Gacronhon, Ch. hos, hȣe; *mettre v. être de travers.*
Gannagaracronhon, *barre de travers.*
Gacroñȣase, R. *f.* ȣas; *attendre quelq. en chemin.*

Ocroñȣe, Oroñȣe, *il y a un vallon.*
Ocronȣagon, son, *le long du vallon.*
Etioroñȣennion, *il y a quantité de vallons.*
Gacroñȣennion, *se promener.* Ch.

Garonhia, *le ciel.* Garonhioron, *le ciel nébuleux.*
Garonhiaksat — Joronhiogeȣen, *beau ciel.*
Garonhiaksaton, Ch. *le ciel se brouiller.*
Ongȣaronhiaksat, *Nous avons mauvais temps;* a Garonhiaksaton, S. neut.
Garonhiaenton, R. *caresser.* Raro dicitur ab Iroquaeis Agnier.
Garonhiatiron, *ciel droit.*

Garonhiageñon, Ch. ens, en, enne; *souffrir.*
ȣasronhiagen, *tu as bien de la peine.*
Garonhiagense, R. acq. *endurer pour quelq.*
Garonhiagencton, R. *faire souffrir quelq.*

Garonkȣannion, S. *démanger.*
Ongronkȣens, *il me démange.* ȣagronkȣannion.

Oronckȣenna, *leschine, l'épine du dos.*

Garonckȣenstare, S. *parler haut, confusion de voix.*
Garonckȣenstȣannen, *grande confusion et multitude de voix qui parlent ensemble.*
Atronckȣenstȣannen, Pass. S.
Atronskȣenθoton, Ch. *Diminuer ce bruit et cette confusion.*
Ateronkȣanni, R. *chasser, expeller; f.* kȣen. Steronkȣen, erhar.

Garonta, *arbre.* Garontiagon, *couper un arbre.* Ch.
Karontorenseron, Ch. *le fendre.*
Garontiennenon, Ch. *un arbre tomber.*
Garontagacte, *un arbre coupé.* Garontagannha, *un piquebois.*
Garontotsera, *un coffre.* Te garontȣte, *une souricière.* S.

Garóri, R. *raconter*; risk, ri, rianne. Hesrori, *raconte luy.*
Atrori, Ch. pass. *raconter.* Satrorianne, *Va raconter.*
Garoriaton, R. *raconter avec q. chose.*
Atroriase, *raconter de quelq.;* R. *f.* ras.

Garorogon, Ch. roks, rog, roχe; *assembler.* Garorogi, R. *f.* roks.
Gannestarorógon, Ch. *assembler, amasser du blé dans un tas.*
Atrorógon, Ch. *s'assembler.*
Atroroχon, Ch. χes, χe; *s'aller assembler, aller voir.*

Garȣston, Ch. θa, t, tanne; *invoquer l' Otkon sur q. c. songée qu'on donne.*
Garȣstanni, R. *f.* ten.

Garȣt, Ch. θa, ten, tanne; *petuner.*
Garȣtagȣanni, R. *f.* tagȣas; *Prendre le calumet de quelqu'un qui petuner pour fumer.*
ȣagonrȣtágȣas, *que je fume dans ton calumet.*

Garȣt, R. *manger la portion d'un autre.*
Ehiarȣt, *il mangera ta part.*
Garȣten, S. *être affable.*
Gaȣendarȣten, S. *avoir la voix douce, affable.*
Gan^e^negatȣten, *eau douce.*
ȣagon^e^neganhonθo onnegarȣten askennen asinnontonnionheg, *Je te donne un doux breuvage pour que – – –.*
Otsihȣa^c^rôten, *peau passée d'orignac ou vache sauvage.*
Gasihȣarótonni, Ch. *en passer une.*
Gas v. **Gasa**, *donne apporte.*
Gasaa, Ch. *enfant : on nomme aussi ainsi un puisné ou puisnée.*
Gasa, *bouche.*
Gasaga^c^renton, Ch. *avoir la bouche ouverte.*
Gaskȣegon pro Gasagȣegon, R. ks, g, χe; *fermer la bouche.*
Ataskȣegon, *fermer sa bouche.*
Gasagaionton, Ch. cum nota local, tes, te, tesere; *faire le cry de victorieux*
Tajesagaiont, *on fait le Kohe.*
Gasaien, S. *être lent.*
Gasajạtanni, R. *f.* ten; *retarder quelq. par sa lenteur.*
Gasajáton, *rendre lent; θa,* t, tanne.
Osaheta, *fezolles.* Gasahetageiijon, Ch. *escosser des fezolles.*
Gasatáon, Ch. tas, tanne; *tomber à la renverse.*
Gasaten, R. *porter sur le dos;* tensk, ten, tensere. Inde Agosatensk, *un cheval.*
Gasenda, Ch. *nom, avoir réputation, être considérable.*
Hatisenda son, *ils sont tous considérable.*
Gasendȣannen, Ch. nen, nennen; *être considérable, grand guerrier*
Gasendȣannhaton, R. *rendre, faire quelqu'un considérable.*
Atsendȣannhaton, Ch. *devenir brave.*
Gasendȣtagȣan, R. gȣas, go, gohe; *faire mourir un considérable.*
Atsendȣtagȣan, Pass. Ch. *un capitaine considérable mourir.*
Gasennajen, R. *honorer quelq. huro.*
Atsennajen, Ch. *être beau, bien fait.*
Atsennajenton, Ch. tons, ton, tonsere; *idem.*
Gasendare, Ch. *avoir son nom écrit.*
Gasennaronnion gannearhonge, *leurs noms sont dans le livre.*
Gasennon, R. *donner un nom à quelqu'un.*
Satesnisenda, *Vous avez le même nom.*
Gasennon, *au milieu.*
Sateȣasennon itȣes, *Nous sommes à moitié chemin.*
Gasennion, R. nies, ni, niese; *vaincre quelq.*
Gasennion, Neut. S. *être vaincu.*
Ongesenni, dit on v. g. *dans un festin où l'on ne peut pas tout manger; je suis vaincu.*
Gasense, *haïr*, S. *être fâché.*
ȣaksense nagrihȣanderen, *Je suis fâché d'avoir péché.*

Gasennonni, minus usitat apud Agnier, *caresser quelq.* Sed
Atsennonni v. Atsennonnion, utriusq. parad. *être heureux, bien aise.*
Taonχen rotsennonni! *O qu'il est aise!*
Atsennonniaton, Ch. *être heureux pour ou par q. c.*
Gasendio, *bon tireur*, Ch.
Gasendaksen, *mauvais tireur, maladroit.*
Atesendioston, *prendre bien sa visée.* Ch.
Gaseráton, Ch. tonsk, ton, tonne; *tendre une peau.*
Gaseratonni v. Gaseratonse, R. *f.* tons; *tendre à quelq.*
Gaseratongȣan, Ch. *destendre une peau.*
Gaseratongȣanni, R. *f.* gȣas.
Gaserohen, Ch. *être méchant homme.*
Atserohâton, Ch. θa, tanne; *faire une méchante action.*
Gaserȣannen, *grande faute.*
Ojerȣannen okti asȣegon aχeion, *Il faudrait bien en avoir pour que j'en donnasse à tous.*
Oserenta, *sommeil.*
Gaserentagon, S. *aimer le sommeil, grand dormeur.*
Gaserentonianni, R. *f.* nien; *troubler le sommeil à quelq.*
Gasentaráon, S. taras, ranne, rasere; *avoir sommeil.*
Gaserentio, S. os, o, osere. Gaserentioston, Ch. *avoir beau songe.*
Gaserentakseiion, S. sens, sen, sensere; *avoir mauvais songe.*
Gaserentaȣenrion, *avoir eu un mauvais songe suivi de quelq. malheur;* ries, rie.
Gaserentontarhon, R. *immitere soporem.*
Gaserhon, Ch. serask, seraȣe; *arroser, jeter l'eau.* Est R. *baptiser.*
Katke eskeseraȣe? *Quand me baptiseras-tu?*
Gaserhoton, Ch. *mouiller avec.*
Gaiatoserhon, S. *être mouillé de la pluye ou autrement.*
Gandigon^craserhon,
Oserha, *quelque chose liquide qui s'est épaissi*, v. g. *de la sagamité.*
Oserha ȣasatkaston, *Tu as fait de la bouillie bien épaisse.*
Gaserhonni, Ch. *en faire.*
Ateserhonni, Ch. *de la bouillie s'épaissir.*
Gaseron, Ch. res, re, resere; *suivre, poursuivre.* Est R.
Sagonieres, *il les poursuivent.*
Atatseron, Ch. *idem.*
Tȣataseron, Ch. *aller à 4 pattes.*
Tȣategiseron, *aller sur son derrière*, v. g. *de cane.* Ch.
Gaseriθa, *une traîne, une chariot.*
Gontiseras agosatensk, *les chevaux traînent.*
Oseks, *gomme, bray.* Oseksta, in comp.
Gasestarhon, Ch. *gommer, mattachier* v. g. *une peau.*
Gaseronni, Ch. *accommoder q. c. faire une hache.*
Inde vocant Europæi, sed est 1[ae] conj. Aseronni, Ch.
Onseronni, adv. *ensemble, au même lieu.*

Onseronni ȣahontien, *Ils sont dans la même càbane.*
Skaseronni, Ch. *satisfaire.*
Jesȣs soseronni nyongȣarihȣanderen, *Jéus a satisfait pour nos péchés.*
Gaseronniaton, Ch. *accommoder avec q. chose.*
Gaseronnianni, R. *f.* nien; *accommoder à quelqu'un.*
Gaseronni, *habiller quelq.* R.
Atseronni, Ch. *s'habiller, s'accommoder.*
Atseronniaton, Ch. *s'accommoder avec q. c.*
Gaiataseronni, R. Atiatseronni, Ch.
Gaseronniasion, R. *déshabiller quelq.*
Atseronniasion, Ch. sions, si, sionhe.

Gasie, R. *porter sur son dos comme à cheval.*
Gasiharon, Ch. *boucher.*
Atsiharon, Ch. *être bouché, fermé.*
Gasiharongȣan, Ch. *desboucher.* Atsiharongȣan, Ch. *se desboucher.*
Gasiharon^{c}kon, Ch. *boucher avec q. chose; p. & f.* kȣa.
Kasiharáon, Ch. ras, ranne; *être trop pressé.*
Kasiharase, neut. acq. S. *être trop à l'étroit.*
ȣatȣagesiharas, *cela ne peut pas entrer où je le voulais mettre.*

Osinnigota, *cheville du pied.*

Gasire, *une couverte à grand poil,* v. *étoffe Iroquoise.*

Gasisat, *un pilon.*

Kaskaráon, S. raȣas, raȣe; *ouvrir la bouche.*
Kaskaraȣaton, S. *boâiller.*
Gaskaraton, S. θa, t, θe; *être amer, désagréable au goût.*
Kaskaratonse, neut. acq. S. tons, ton v. tonhas.
Gaskáren, Ch. *mordre;* rha, ren, ranne. Est R.
Roskoraskon, *le grand mordeur.*

Oskaro, *du chanvre.* Gaskorohon, Ch. *aller chercher du chanvre.*

Gaskenn, *corpus a quo discessit anima.*
Hatisken agon, *manes.*
Eskennannigé, *au pais des âmes.*
Ti saskennennont, *tu as un visage de mort.*
Gaskennonton, Ch. tes, nont, tese; *aller au pays des âmes.*
Inde forte Oskennonton, *Cerf* quia timidum est animal quod se semper putet esse mortuum.
Gaskennonteton, *locus quo itur post mortem.*
Garonhiage jeskennonseθa niagorihȣioston, *Les Chrétiens vont au ciel après la mort.*
Naie jeskennonteθa^{c}kȣa nonhȣentsiagon nierihȣanderaχon, *C'est le péché qui fait aller aux enfers.*
Gaskennonteton, R. *faire mourir quelqu'un de peur.*
Gaskendendis, R. *porter malheur à quelqu'un.*
ȣahotiskennendis, *Il y a eu un mauvais presage contre eux.*

Gaskennatiagon, S. *avoir la jaunisse.*

Oskennen, *en paix, doucement.*

Tosken, toskenha, *loin.*

Toskenha etȣagatention, *a longe profectus sum.*

Gaskenra, *la guerre.* Inde

Hoskenragetete, S. 2ae conj. *soldat; impf.* takȣe, *f.* tak.

Oskenrha, *la rouille.*

Gaskenrhare, *il y a de la rouille.*

Oskokȣa, S. *portion des Agoianders.* Raoskokȣa.

Gaskokonni, Ch. *faire de ces portions, mettre en réserve pour les anciens et considérables.*

Gasko, *être dans la chaudière,* dicitur de re quæ habet vel habuit vitam: *quelque animal estre dans l'eau.* Desinit in O in omnibus temporibus.

Erhar ȣahasko, *Il a fait festin d'un chien mis dans la chaudière.*

Atatesko, *mettre pour soi dans la chaudière quelq. animal.*

Gaskoon, Ch. kos, konne, kosere; *s'enfoncer dans l'eau, se noyer.*

Gaskoton, R. *faire noyer, enfoncer dans l'eau.*

Gaskohon, Ch. *mettre quelq. animal dans l'eau non pas pour l'y cuire.*

Annoȣara hoskohon, *Il a mis une tortue dans l'eau;* os v. ohose.

Gaskose, R. *mettre dans l'eau pour quelq.*

Hotkon hoñaskose, *On lui a mis du venin dans sa tasse.*

Hotkon hoteskohose, *Le démon s'est mis dans son plat.*

Gaskogȣan, R. gȣas, go, gohe; *retirer de l'eau.*

Onsahoñaskógo, *on la tiré hors de l'eau.*

Ateskogȣan, Ch. *se retirer soymême hors de l'eau.*

Gaskonsage, *au saut ainsi appellé par les Iroquois,* a Gaskonsa, *dent. Saut à pic.*

Etioskonsenton, *Idem quod* Gannaȣenton, *chute d'eau, cascade.*

Gaskȣa-egon, Ch. *battre le blé ou autre légume;* ks, g, χe.

Gaskont, act. θa, tan, tanne; *rostir quelq. animal.*

Seskonten, *rostis* v. g. *ce poisson.*

Ateskont, Ch. *rostir pour soy.* Gaskont, pans. *être rosti.*

Gaskont jongȣannenhisacton, *Nous avons assaissonné de poisson rosti.*

Gaskontaon, Ch. tas, tanne, tasere; *animal tomber dans le feu, se brûler.*

ȣahaskontanne, *il est tombé dans le feu.*

Gaskonθanni, *f.* θas, R. *rostir à quelqu'un.*

Tageȣaronθas, *fais moi rôtir de la chair.*

Gaskonθon, R. *faire tomber dans le feu.*

ȣahoñaskonθo, *on l'a brûlé, mis dans le feu.*

Gaskontagȣan, R. *retirer du feu,* cum part. reit. Jesȣs sesongȣaskontagȣan jonhȣentsiagon.

Oskȣira, *branche d'arbre.*

Hoskȣiriaχon, *il est allé couper une branche.*

Kaskȣiriagon, Ch. *quitter son pays pour demeurer chez l'ennemi.*

Onne ȣatieskȣiriag, *Voila qu'on se réfugie chez son ennemi.*

Askonte, S. *écorce.* Gaskontara, in comp.
Raoskonte, *son écorce.*
Gaskontario, *belle écorce.* Okario, *idem.*
Gaskontaraton, Ch. tons, ton, tonne; *mettre des écorces sur l'échafaud.*
Gaskontaragohon, Ch. *en aller querir.*

Gasniennon, R. nons, non, nonre; *travailler pour quelq.*
Atasniennon, Pass. Ch.
Gasniennonron, *aller travailler pour quelq.*
Atasniennonron, *idem.*

Gasnonge, *doigt*, Ch. Gasnonsa, in comp.
ȣaθoñasnonsiag, *on luy a coupé le doigt.*

Gasnoron, Ch. re, reskȣe, reg; *aller faire viste q. chose.*
Josnore, *impson.* Agosnoreg, *cela seroit bien viste.*
Ejosnoreg, *ce sera bien viste.*
Raȣendasnore, *il parle viste.*
Gasnoraton, Ch. *dépêcher q. chose, haster.*
Gasrihȣasnorat, *expédie viste l'affaire.*
Atisnore, *croître promptement en âge.*
Hondatisnore, *ils vieillissent bientôt.*

Osogȣa, *noix*, S. Raosogȣa, *sa noix.*
Gasnora^{c}kon, R. kȣa v. kȣe; Gasnorakȣanni, *f.* kȣen, } *reprocher à quelqu'un qu'il a dit ou fait q. chose.*

Gason, *faire.* In comp. frequens; *pns.* & *f.* sa, n, saanne.
Diȣ raonhȣentsison, *Dieu a fait la terre.*
Sagoiatison ongȣe, *Il a fait l'homme.*

Gason, *achever, consommer*, Ch.
Onne ȣaksa v. ȣakson, *j'ai tout achevé.*
Atson, Ch. *être consommé, brûlé.*
Onna ontsa gannatarok, *Le pain est brûlé, réduit à rien.*
Atiatatson, Ch. *brûler.*
Gasaanni, R. *f.* sas; *consommer à quelqu'un q. chose.*
ȣaskȣannenstasas, *Vous nous consommes notre bled.*
Atsaanni, R. recip. *être consommé à quelqu'un.*
Ongȣatnenstasas, *Mon blé s'est consommé à moi.*
Garihȣision, Ch. *conclure l'affaire.*
Areko jongȣatrihȣisaanni, *Notre affaire n'est pas encore faitte.*

Gason, *tuer*, (*de multitudine.*)
ȣaonχisa, *on nous a tué.*
Ontagasaaton, Ch. θa, t, tanne; *épuiser tout.*
Ontagasat, *elle a tout épuisé.*
Tȣatsaaton, Ch. *être épuisé totalement.*
Onne ȣaθontsat ȣahontenti, *Ils sont tous partis.*
Onne etiogatsaaton, *tout est épuisé.*
Onne eθondatsaaton ehotiageñon, *Ils sont sortis tous.*

Gasogeñon, Ch. ens, en, ensere; *broncher d'un cheval.*
Gasogenskon, freq. S.
Jaten gaiannatogen agosatensk josogenskon, *Mon cheval bronche sæpe.*
Gasogenton, *faire broncher.*
Atesogenton, *se mettre à broncher.*

Gasonne, *le dos*, Ch.
Gasonnionkon, *deffendre, vêtare.* V. Sup. 1ª conj.

Osonȣe, *fosse, creux, trou profond.*
Ken niosonȣa, *Il y a un trou de cette grandeur.*
Gasonjonni, Ch. *faire un trou, creux, fosse.*

Gasonraton, Ch. θa, tanne. Gasonratanni, *f.* ten.
Josonrataskon, *fainéante qui a de la peine à tout.*

Gasonrion, Ch. *gouster;* ries, ri, riese.
Jaten te jonnatasonrion ok eθo ȣagȣajatȣten, *Elle n'entra pas dans le fort, elle fût brûlée là même.*
ȣage ȣarasonri, *J'ai goûté de la chair.*
Gasonrieᶜton, *faire goûter.* R.

Gasȣan, S. sȣas, so, sohe; *flairer, sentir.*
Ongeso, *j'ai flairé.* Ongeȣaraso, *j'ai senti la viande.*
Gasȣaton, R. *faire flairer.*
Atesȣaton, Ch. *faire flairer à soimême.* Satesȣat.

Kasȣannet, Ch. *doubler;* θa, t, tanne.
Atasȣannet, S. *être double.*
Gasȣannetarion, Ch. *doubler de plusieurs doubles.*
Atasȣannetarion, S.
Gasȣannetase, R. *doubler, augmenter à quelq.*
Te horihȣannetarion, *Il a joint plusieurs affaires*, a Kannannet. (Onnejout.)

Gasȣaton, S. *être méchant;* ȣa, t, tanne.
Josȣat, *Que cela est fâcheux.*
Rosȣat, *le méchant, l'importun.*
Gasȣaton, S. *haîr pour q. chose.*
Gasȣatanni, R. *f.* ten; *haîr quelqu'un ou quelque chose par l'importunité et incommodité qu'on en reçoit.*
Gasȣenon, Ch. ens, en, ense; *haîr.* Est R.
ȣagonsȣen, *je te hais.* Gasȣenseron, freq.
Atatsȣeñon, Ch. *se haîr, détester sa vie.*
Gasȣaθeñon, Ch. θens, θen, θensere; *avoir envie de manger q. chose de bon.*
Gasȣaθenston, *être la cause de cette envie; causer le manquement d'assaissonnement ou de q. c. de bon.*
Gasȣaθeton, S. θa, t, tanne; *éclairer*, cum nota local.
Te taksȣatet, *éclaire moy.*
ȣatiosȣaθe gȣann, *Il se fit un grand jour.*
Te josȣaθeθa, *la lumière.*

Osȣen v. **Osȣenta**, *charbon éteint, du noir.*
Osȣentȣskon, *de pur noir.*
Gasȣentarhon, Ch. *marquer avec du noir.*

Osȣengare, S. *une planche.* Gasȣengaronni, Ch. *en faire.*
Jesȣengaronniaθa, *un moulin à planche.*

Ostarokȣa, S. *de la rassade. Ils appellent aussi ainsi du menu plomb.*

Gastaθeñon, S. extra comp. Aθeñon, in comp. *être sec;* θens, θen, θensere.
Jostaθens, *cela est sec.*
Ganniataθeñon, S. *avoir soif, avoir le gozier sec.*
Ganniataθenston, *ce qui fait sécher.*
Gastaθaton, act. θa, t, tanne; *faire sécher.*
Sestaθat, *fais sécher.*
Gastaθase, R. *f.* θas; *faire sécher à quelqu'un.*

Gastahron, Ch. rons, re, ronne; *ne trouver pas ce qu'on cherche.*
Gaiatastahron, R. *ne pas trouver quelqu'un.*
Garihȣastahron, Ch. *ne pas trouver l'affaire, la nouvelle.*

Gastaront, Ch. θa, ten, tanne; *sucer, tirer avec les lèvres.* Est R.
Hetsestaronten, *Donne lui à tetter.*
Gastarontanni, R. *f.* θas; *sucer quelqu'un, nourrir quelq. à q. chose vivante.*
Takstaronθas v. Tagestaronθas neȣateȣeton erhar, *Nourris moi un petit chien quand ta chienne portera.*
Gastarontagȣan, Ch. *se déprendre de ce qu'on suce.*

Kastegenhejon, Ch. hejons, heje, hejonsere; *désespérer, perdre patience.*
Kastegenhejaton, idem, *perdre l'espérance.*
Kastegenheiase, R. *faire perdre l'espérance à quelqu'un.*

Kasteriheñon, S. ens, en, ensere; *être pressé, avoir hâte.*
Kasterihaton, S. *se hâter pour q. chose.*
Kasterihaton, R. *hâter quelq.;* θa, t, tanne.
Tetkonsterihatanne, *Je retourneray te hâter.*
Tetkasteriheñon, *à la haste.*

Gasteronhon, *refuser de faire q. c. qu'on commande;* hons; hȣe.
Jontasterhoñhȣe, dit on d'un enfant qui n'obéit pas aux commands de ses parents.

Ostiesera, *les poûmons.*

Gastonton, S. tons, tonte, tonne; *prétexter q. chose.*
Θennon ȣagostonte, *Quel prétexte a-t-on eu?*

Gastonrion, R. *toucher au mal de quelq. et luy causer de la douleur.*
ȣaskistonri si etȣagnonhȣaktannik, *Tu m'as fait mal là où je suis incommodé.*

Gastontere, S. *jointure des os.*
Atestonteragȣan, *un os être demis.* S.

Gastoron, re, reg, Ch. Sastóron, *dépêche, fais viste.* Hæc 2ª persona sola ferme est in usu. Tsiastoron, *vos 2.*

Ostosera, *plumes d'oiseau qu'on a plumé.* S.
Gastosaron, Ch. ronsk, ron, ronhe; *plumer.*

Gastotsiron, *baiser.*

Gasθon v. **Gasθonha,** in comp. *être petit.*
Gannatsiasθonha, *petite chaudière.*
Gasθoton, Ch. θa, t, tanne; *faire petit.*
ȣasrihȣasθot, *tu amoindris l'affaire.*
Gasθotanni, R. *f.* ten; *faire petit à quelqu'un.*
Gasθose, neut. acq. S. *f.* θos; *trouver petit.*
Ongȣasθos, *cela me semble peu.* Ostonha, *un peu.*

Gat, in fine vocabuli cui præponitur par la redup. signat *unitatem.* S. *vel* Ch.
Skat, *un.* Skarihȣat, *une chose.*
Tsionhȣentsiat, *un seul pays.*
Tsagiatat, *Nous ne sommes qu'un, nous sommes frères.*
Sajatat, *un seul;* Skajatat, *une seule.*
Sic Sagat *vel* Sagarihȣat, *idem est.*
Sajonhȣentsiat, Sa-agiatat, Sa-agȣajatat, Sahatiatat, *eœdem sunt;* Sagontiatat, *eœdem sunt.*

Gata, in comp. Gatara, *fange.*
Okti jotara, *parole de mépris, homme de néant.*
Gataragetskȣan, S. *se lever,* dit on d'un malade qui a peine à se relever.

Gataχon, Ch. *p.* & *f.* χ, n, χese, *courir;* χes, pro habitu.
Θo gataχi erhar, *le chien court.*
Ontahataχe, *il vient en deçà en haste.*
Gataχeton, quando locus exprimitur ad quem pergimus ; θa, t, tanne.
Ken nongȣati esotaχeton, *Il s'en est couru de ce côté là.*

Gatagȣentaron, *être gisant.*

Kataon, *se lever debout.* Vide Conj. anomalium.
Tektas, ȣatektanne, tektasere, dicitur tertas de habitu.
Onne gen te hatas nhetsieña, *Ton enfant est il asses fort pour se tenir debout? Se tient-il debout?*
Te gete, de actu; te sete, te hate.
Kataston, R. sθa, st, stanne; *faire tenir debout.*

Gatase, in comp. stum, *tourner autour;* stes, se, sese.
Eθotinnonsatases, *ils tournent autour de la cabane.*
Ganniengȣatases, *la neige pirouette.*

Garatase, in comp. cum voce pass. *entortiller, tordre.*
Joteratase, *cela est entortillé, enlacé.*
Joteroñaratase, *un fer tordu,* seu *une vrille percerette.*
Joterontatase, *arbre, colomne fait en vis* seu *canalée.*

Gaθare, *parler;* tarha, taren, taranne. Assumit in dual part. dualit.
Te jagniθarha, *Luy et moi parlons ensemble.*
Gaθaron, *de multit.*
Gaθaranni, R. *f.* θarhas, *tancer quelqu'un.*

Gate, *être;* takȣe, teg.
Toskenhe etkáte, *cela est bien loin, différend.*
Gate, in comp. *être présent.*
Jaten sondigon^c^rate, *Il n'a pas d'esprit.*
Ken ongȣentiokȣate, *Nous autres qui sommes ici en bande.*
Ti gate, *être différent.* Ti hatite, *ils sont différents.*
Ti ejatate v. Ti jejatennon, *C'est une autre sorte d'homme.*
Te hatiatate onseronni te hatiatennon hotinnonsionni, *Les Français sont différents des Iroquois.*

Katen, anom. tens, ten, tensere; *se lever en haut.*
ȣatiagȣaten, ȣatitȣat, ȣatisȣat, ȣaθatit, ȣatkontiten.
Katenston, *faire lever en haut.*
Te gȣatenston okȣesen, *On a fait lever la perdrix.*
At de homine qui evehitur in altum dic : Te hoñajatakȣan v. Te hoñajaratatan, *On a levé en haut.*
Katense, R. *se lever pour ou contre quelqu'un.*
Ti hetsetens, *assurge illi.* ȣaθonatitens, *on se leva sur eux.*

Gatennion, in comp. nions, nion, nionhe; *changer.*
Garihȣatennion, Ch. *changer l'affaire.* Est R.
ȣahoñarihȣatenni Onnontio, *On a change l'affaire d'Onnontio.*
Gaiatatennion, Atiatatennion, S. *se déguiser.*
Atrihȣatennion, Ch. *l'affaire se changer.*
Atrihȣatennionse, R. *l'affaire se changer à quelqu'un.*

Gatenson, *impf.* tensonnen, *f.* tensa; *épais, gros.*
Ken nigatens, *épais de cela.* Nigatensa, *un peu épais.*
Nigagenhatensk, *de la toile.*
Gagenston, *faire épais.*

Gatentaron, Ch. *estendre au sec;* tarons *vel* tara, taron, taronhe.
Snenhatentaron si etiorakȣt, *étends le blé au soleil.*
Gatentaron^c^kon, Ch. *ce sur quoi l'on estend.*
Gatentaronse, R. *f.* rons; *estendre au sec pour quelq.*

Ga^c^te^c^ra, *racine à coudre canot.*
Gaterogeñion, Ch. *netoyer, racler des racines.*
Ga^c^terogeniase, R. *accommoder des racines à quelqu'un.*

Gateronkȣanni, R. nisk, kȣen, nire; *chasser, éloigner.*

Gateronni, S. *être poltron.*
Gateroñon, S. ons, onn, onsere.
Gat-ronton, S. *craindre pour q. chose.*
Gat-rontanni, R. *f.* ten; *faire craindre quelqu'un.*

Gaθeñon, In comp. tantum.
Jostaθen, *sec.* Gaȣaraθen, *chair sèche.* Vide supra Gastaθeñon.
Gaθase, R. ȣageȣaratase; *Je trouve la viande sèche.*
Gaθeñon, S. *ne vouloir pas;* θens, θen, θensere.

Oθesera, S. *farine.* Raoθesera, *sa farine.*
Gaθeseronni, Ch. nisk, ni, nianne; *faire de la farine.*
Gaθeseronnianni, R. *f.* nien.

Gaθeseronniaton, Ch. *en faire avec q. chose.*
Jeθeseronniaθa, *un moulin à moudre du blé.*
Gaθeton, Ch. θa, t, tanne; *piler farine ou autre chose.*
Gaθetanni, R. *f.* ten; *piler à quelqu'un.*
Gaθetaᶜkon, Ch. *ce avec quoi ou le lieu où l'on pile.*

Gatie, *voler* (tie pro actu, ties pro habitu), tie, tiese.
Gontities, *les oiseaux.*

Kato, S. *nasse.* Raota, *ses.*
Gatoseronni, *faire des nasses.*
Gatoserohon, Ch. *les mettre dans l'eau.*
Gatoseroñonnon, *aller pêcher avec des nasses.*
Gatoseroȣȣan, *les tirer de l'eau.*

Gatogen, Ch. toχa, tog, toganne; *s'appercevoir, savoir.*
Areχo te getoχa, *Je n'en sçais encore rien.*
ȣagrihatoganne, *Je va m'informer de l'affaire.*
Songȣandigonᶜratoχa Diȣ, *Dieu voit cœurs.*
Gatogen togenske, *il est vrai, être vrai.*
Hajatógen garonhia rotaȣejennonni, *Il y a une personne déterminée qui a fait le ciel.*
Egatogenne egarihȣatogenn, *Cela se vérifiera.*
Areko jorihȣatógen, *la nouvelle n'est pas encore assuré.*

Gatógen, regit futurum quando signat *à fin que.*
Agȣast asrihȣiost gatogen esatsennonni garonhiage, *Sois bon chrestien à fin que tu sois heureux au ciel.*

Gatogase, S. *s'appercevoir de quelq. action d'un autre; f.* togas.
Gatogáton, *s'appercevoir par q. chose.* Ch.
Θennon ȣastógat, *Quel indice as tu de?*
Jaten skat te ȣagtogaton, *je n'ay aucune preuve.*

Gatogeñon, S. in comp. Gandigonratógen, ens, en, ensere; *sçavoir.*
Jaten te ȣagennigonratogen, *je ne suis pas assuré.*
Gatogenston, *s'assurer par q. chose.*
Gatogenstanni, *f.* ten, *assurer quelqu'un par q. chose.*
Tagrihȣatogensten, *Eclaircis moy de la nouvelle.*

Gatogenton, *être liberal, avoir grand cœur.* S. θa, t.

Gatogeᶜton, *choisir, marquer, déterminer.*
Senniseratógeᶜt, *marque le jour.*
Gatogeᶜtanni, R. *f.* ten; *marquer, déterminer à quelqu'un.*

Gatogeᶜton, etiam pass. signat *estre saint.*
Gaiatatogeᶜton v. Gaiatatogeston, S.
Enniseratogeton, *jour saint, le dimanche.*
Ejorhenne ejongȣentatogestanne, *Nous aurons dimanche.*

Te gatorarágon, Ch. raks, rag, raχe; *presser, serrer.*
ȣateskȣasitorarag, *tu me presse, foule le pié.*
Te gatorarakton, Ch. *presser avec q. chose,* a Garagon, in comp. tantum usitatum.
ȣahagonsorarag, *il s'est frissé le visage.*

Te gatoraraksion, Ch. *séparer se qui étoit joint ensemble.*
Te ssatoraraksion, *se séparer.*
Tonsontoraraksi, *Cela s'est séparé.*

Gatsannion, Ch. nis, nig, nisere; *craïndre.*
Garihsatsannion, *apprehendre une affaire.* Est R.
Jaten te getsannise, *Je ne les crains pas.*
Gatsanniton, *être formidable.* S.
Rongsetatsannit, *homme redoutable*
Jotsannit v. Jotsaniθa, *chose étrange.*
Atetsanniton v. Atetsannitanni, R. θa, t; *épouvanter quelqu'un.*

Gatsaste, Ch. *être fort;* tekse, teg.
Gasendatsaste, *voix forte, efficace.*
Atsendatsaste, *rendre sa voix efficace.*
Atesatste, Ch. *s'efforcer, faire un dernier effort.*

Gatse, S. extra comp. Gatsita, in comp. *gourde, bouteille.*
Gatsetonte, *il y a des bastions.*
Gatsetogon, *gourde vuide.*

Gatsennen, S. *animal domestique, serviteur, esclave.*

Otsera, *chaussée.* Te gatseraronhon, *y avoir un chaussée à travers.*
Jaten te ontnegongot agsat satkannegata si etiotseraronse: *L'eau ne passe point, mais s'arrête à la chaussée.*

Gatsiarasi, R. *donner du petun; f.* rhas.

Katsiahon, R. hons, hon, honsere; *parler à l'oreille de quelqu'un.*
Tetsiáron, *id. tous les deux.*

Gatsien, S. *plat,* extra comp. N. Raotsien, *C'est le plat d'un tel.*
Gatsiasesen, Ch. *polir un plat.*
Gatsienton, Ch. θa, t, tanne; *puiser de.*
Gannegotsienton, *puiser de l'eau.*
Satogsatserotsient, *prens en une euillerée.*
Gatsientakon, Ch. *puiser avec q. chose;* ksa, ksanne.
Gannackon jetsientaksa, *un sceau.*
Gatsienhon, Ch. hes v. he, ha, hese; *aller puiser de l'eau.*
Gatesientanniseron, R. *aller puiser de l'eau pour quelqu'un.*
Gatsientanni, R. *f.* ten; *donner à manger à quelqu'un.*
Tagetsienten, *Donne moi à manger.*

Gatsienton, R. θa, t, θe; *médeciner, guérir quelq.*
Sagotsientannion jegaiontas, *Il guérit tous les malades.*
Hatetsiens, *médecin.*
satetsiens v. satetsienha, *chose médicinale.*
Atetsientakon, Ch. *se servir de q. c. pour médecine.*

Gatsienha, *foyer.*
Katsienhiagon, Ch. *diviser le foyer.*
Skatsienhat, *un seul feu.*
Te jagsatetsienhannegen, *Nos foyers sont les uns près des autres.*
Te jotignitsienhat, *Nous sommes au même feu.*

Neθo nonȣe te jagȣatetsienhatre, *Nos foyers sont à cette distance l'un de l'autre.*
Gatsiaregon, Ch. *pousser le feu, l'atiser.*
Gatsiareseron, Ch. *éparpiller le feu à fin qu'il s'allume.*
Gatsihajen, Ch. *tenir conseil;* takȣe, en, enne.
Otsigȣara, *charbon allumé.*
Kenniotsigȣarandȣtes, *brazier àrdent.*
Gatsigȣaront, Ch. *faire un nœud.*
Jotsigȣaronton, *il y a des nœuds.*

Otsihensta, *noir.* Gatsihenstatsi, *être noir, vétu de noir.*

Gatsinn, Ch. *masle;* tam de hominibus quam belluis, extra comp.
Gatsinnata, in comp. v. Gatsitsera.
Ratsitserio, *bon chasseur.*

Gatsinnogáton, Ch. *boetter.*

Otsinnigȣar, *couleur verte, bile.*
Rotsinnigȣaraksen, *bilieux, colère.*
Gatsinnigȣaraȣenrion, S. *La bile se remuer et causer vomissemens.*

Otsinneta, *lente vermine.* Tsinnon, *des poux.*
Otsinnetare, *il y a des lentes.*

Gatsinnionkera, *morue.*
Hotsinnionkȣarȣt, *il y a de la morue.*
Hotetsinnionkȣarȣtatie, *il va avec la morue.*

Gatsinnionkerageȣen, Ch. *se moucher.*
Gatsinnionkerageȣenni, R. *moucher quelq.*
Onniatarajenti gatsinnionkerageȣaθa, *un mouchoir.*

Otsinnoña, *vers.* Gatsinnoñagon, *être plein de vers.*
Otsinnonhia°ta, *veine, nerf.*
Katsinnonhiatiagi, R. *seigner quelq.*
Katsinnonhiatannerágon, Ch. *prendre une veine pour l'autre.*

Otsire, *feu.* **Gentsirat,** *il y a du feu.*
Agentsiraranne, *le feu est tombé.*
Gentsiraieri, S. *tenir conseil.*
Gentsiranno, *le feu être éteint,* seu *le conseil fini.*

Gatsiregon, S. *succer.*
Gatsirontagȣan, Ch. *prendre du feu.*
Gatsirontaton, Ch. *branler un brandon de feu.*
Gatsirentaon, Ch. *douleur s'appaiser;* tas, tanne, tasere.
Gatsirentaton, Ch. *faire appaiser la douleur.*
Gatsio, os, S. *être infirme, maladif habituellement.*
Gatsioston, *rendre infirme.*
Gatsiohontorianni, S. *ressentir des atteintes de quelque indisposition habituelle.*
Gatsiostanni, R. *causer quelq. infirm habituelle.*

Gatsista, *feu.* Gatsistaien, S. *tenir conseil, allumer le feu du conseil.*
Gatsistontagȣan, Ch. *oster du feu.*
Gatsistontagohon, *aller querir du feu.* Ch.

Otsistok, *étoile,* S. Otsistokȣa, in comp.
Gatsistokȣarannentágon, *étoile attaché.*
Gatsistokȣarannentacktou, Ch. *attacher des étoiles.*
Gatsistogatannion erhar, *chien moucheté blànc et noir.*
Gatsistȣt, *avoir une taye.* S.
Otsiokȣa, S. *portion, morceau de chair.*
Asen niȣatsiokȣage, 3 *portions.*
Gatsiokonni, Ch. *faire les portions d'un festin.*
Otsitsia, *fleur, houblon.*
Gatsitsiararágon, *fleur épanouye.*
Gatstitsionni, Ch. *faire de la bière.*
Jotsitsiont raonnonhȣarore, *Il a une fleur à son bonnet.*
Kakȣan, Ch. kȣa, kȣe, kȣanne; *lever de terre.*
ȣatkekȣe, *je prends, je leve de terre;* ȣatisekȣe, ȣaθakȣe.
Te sekȣa, *lève cela de terre.*
Kajatakȣan, R. *enlever q. c. vivante.*
Gakȣan, R. *enlever à q. l., luy oster q. c.; p. & f.* kȣa, kȣasere.
ȣahoñaχȣa, *on luy a osté.*
ȣaontatekȣa, *on s'entrepille.*
Gaχare, S. *brayer.* Raoχare, *son brayer.*
Ateχare, *avoir un brayer;* re, ren.
Ateχarotsion, Ch. *oster son brayer.* Est etiam R.
Gaχen, cum part. te, *joindre.*
Te hieχen, 2 *jumeaux.*
Te gannehȣaχen, 2 *peaux cousues ensemble.*
Tontageχas, *joins moy cela.*
Gaχahon, *plusieurs choses jointes.*
Te tȣaȣendaχahon, *joignons nos voix.*
Te jongȣandegonraχahon, *nos pensées, esprits sont unis.*
Kaχasion, *desjoindre,* Ch. v. Kaχasiongȣan, est R. *partager, séparer.*
Tȣateχasion, *se séparer,* Ch.
Gaχȣa, *morceau.* Gaχȣio, *bon morceau.*
Gaχȣentaon, Ch. *avoir achevé sa portion.*
Gaχȣannen, Ch. *grand mangeur, gourmand.*
Katson, R. *gaigner au jeu quelq ; p. & f.* sa, *n.* tanne.
Katsannon, freq. Atentson, pass. Ch. *gagner au jeu.*

VERBA 3ae CONJUGATIONIS.

Ehiacraon, Ch. re, ranne, v. rag, rasere; *se souvenir.*
Ehiacrakon, Ch. *se souvenir par q. c.*
Ehiacrakȣanni, R. *f.* kȣen; *faire souvenir quelqu'un.*
Ehiarase, R. *se souvenir de quelqu'un.*
Ekiaron, R. rons, ron, ronne; *nourrir, élever quelqu'un.*
Atchiaron, Ch. *croître en âge, devenir grand.*

Ejen, R. ensk, en, ensere; *encourager.*
Hetsijen Jesȣs, *exhortes, pries Jésus.*

—**En,** In præt. ttum est in usu, *dire.*
Jȣagen, *j'ai dit.*
Isen, Ihaȣen, Raȣen, Jaȣen, &c. *præs.* et *imp.* supplentur per Igatonk, *je dis*; Gatonhakȣe, *je disois.* *Fut.* et *aorist* supplentur per Egiron, v. simpliciter engi esiron v. ensi.
F. N. Jaten hoθennon tagironne v. te gatonne.

Igen, Igennen, aliquando supplet. verbum subst. sum, es, est.
Raȣendio igen, *il est le maître.*
Aliquando signat. diminutionem rei, v. g. Hinnonha igen, *un peu loin.* Raienteri igen, *Il sçait un peu l'affaire.*

Enhȣaten, *avoir pour neveu;* Aχienhȣ, *mes neveux;* Enhȣatensera, *népotisme.*

Ennajeton, non est in usu, sed
Ennajeta^c^kon, takȣa, tak, takȣe; *se moquer de q. c. ou de quelqu'un.* Est R.
Skȣannaietakȣa, *tu nous railles.*

Ennageraton, R. *aliquando habere aliquem vel aliquid pro lege, regula.*
Ennagaraton, neut. *se servir de q. c. pour règle.*
Naie honnennageraton hatiskenni, *Les anciens avoient cela pour règle.*
Atȣendageraton niongȣatetsins, *le songe est la reigle de nos vies.*

Ennasa, *langue.* Satennasonten, *tire la langue.*
Tȣatennokaraȣan, *tirer la langue par dérision.*
Tȣatennokaraȣenni, R. *tirer la langue contre quelq.*

Ennatsa, *fesses,* Ch. est 2ae.
Rannatsatske, *In clunibus.*
Gannatsajagon, R. *fustiger quelq.* v. Gannatsaregon.

Ennekȣannen, *avaler;* nha, nn, nhasere.
ȣahonne^c^kȣann, *il a avalé.*
Ennekȣanna^c^ton, *avaler tout d'un coup.*

Ennejon, Ch. *suer, faire suerie;* ons, on, onne.
Ennejontenni, R. *suer pour ou avec quelqu'un.*
Sneionθo agenneion, *faire chauffer les pierres que je sue.*

Ennejonskȣa, *suerie.*

Ennejon, S. *faire festin.*
Ennejonkon, *faire festin de q. c., donner à quelq. de quoi faire festin.*

Ennenron, Ch. *animal être en chaleur;* res, re, resere.
Onne ȣagiennenre ongnitsennen, *Nos chiens sont en chaleur.*

Tȣennenstren, Ch. *lier les bras à la façon des esclaves.*
Tȣatnenstren, *être ainsi lié.*
Tȣanneregȣaraon, Ch. *fulgurare.*

Ennt, R. *parler à quelqu'un ou de quelqu'un.*
ȣaongȣenhas, *me dit on.* ȣasagaȣenhas, *il leur dit.*

Enniaȣe, *cent :* huic proponitur partic. Te habet tantum plural.
Skat te jagȣenniaȣe, *nous sommes cent.*

Te skenniaȣe, Te honnenniaȣe, et sic conjungitur quando est sermo de re vivente.

Plusquam perf. Enniaȣennen, f. niaȣeg v. niaȣehag.

Quando vero est sermo de inanimatis, dices :

Skat te ȣenniaȣe, *un cent;* Tegni te ȣenniaȣe, 200; Enniaȣesera, *centaine;* Skat niȣenniaȣeserasen, *mille* seu *une dizaine de cent.*

Ojeri atejagȣenniaȣe asen tsiagȣenniaȣeserare, *nous sommes* 1300.

Ennihen, *præt.* & *fut.* sunt tantum in usu; *emprunter.*

Etiagonnihen, *on a déjà emprunté.*

ȣagonni, *je te preste.* Tagni, *prete moy.*

Ennihase inna, *emprunter de quelqu'un.*

Ennihason, *aller emprunter;* se, sa, sere.

Honnihaskon, *grand emprunteur.*

Egoñiennihas, *j'emprunterai de toy.*

Enniôt, *inviter au festin;* R. θa, ten, tanne.

Atenniot, Ch. *faire festin.*

Atenniotaken, Ch. *faire festin de.*

Atenniotasken, S. *faire souvent festin.*

Ennhonsa, *avoir pour gendre.* Raȣennhonsa, *son gendre.*

Ennet, R. *coucher un enfant dans son sein;* θa, t.

Hienneθa, *je le couche avec moy.*

Goñjennetakȣan, *dit l'Agnier à l'Onnejȣt.* Tȣennigatiagon.

Ennisegȣan v. **Enniskȣan,** S. gȣas, go, gohe; *différer.*

Enniskȣaton, *différer pour quelque chose.*

Ennisera, *échaffaut.* Enniserare, *il y a un échaffaut.*

Jontatenniseraren, *on met sur l'eschaffault.*

Ontetenniseraȣeron, *on le vuide, on renvoie les prisonniers.*

Ennisera, *jour.*

ȣennisera onȣe v. okti ȣenniseratéa, *un jour ouvrier.*

Jatė ȣenniserâge, *tous les jours.*

Enniserokte, Ch. θa, ten, tanne; *passer le jour.*

V. Enniseriagon, *assumit plerumq.* notam localitatis.

Enniseroktakon, *le lieu ou la chose pourquoi on passe le jour.*

Enniseraronni, *avoir la fièvre tierce.*

Jȣenniserontie, *le lendemain.*

Ennisȣan, Ch. *passer le jour à faire quelque chose;* sȣas, so.

ȣagenniso ȣagnaarhon, *j'ai passé tout le jour à écrire.*

Ennisȣaton, *la chose qui fait passer le jour.*

Ennisne, *en haut.* Andichon.

Tȣennisiton, *aller et venir en un jour de quelque lieu.*

ȣatkennisat gannaȣage si ȣagennon, *Je suis allé et venu de Gannaȣage en un jour.*

Enniskotáon, *se mettre devant quelqu'un sur son derrière pour conférer avec luy, ou lui faire le rapport,* v. g. *d'un conseil tenu.*

Enniskotanni, R. *f.* θes.

Enniskotagȣan, *se retirer de devant ceux devant qui l'on estoit ainsi assis.* Enniskotagȣanni, R. *f.* gȣas.

Ennisnonsajen, Ch. *se reposer.*

Ennita, *lune.* Ennitehen, Sateȣenniten, *la pleine lune.*
Atenᶜnitoktc, Ch. *la lune finir.* Jotennitonnia, *quartier de lune.*
Areko tsiotennitison, *nondum plena est.*

Ennitaien, Ch. *fianter;* ensken, enne.
Ennitajenton, *de pluribus.*
Jennitaientakȣa, *lieu où l'on f.*
Ennitennion, S. nies, ni; *pedere.*
Tȣennitose, R. *pedere alicui.*
ȣaθagennitos, *il m'a petté au nez.*

Ennitiagon, Ch. *mettre à son col quelq. ornement.* Ennitiasion, *l'oster.*
Tȣennitakaren, 2 *animaux accouplés.*
Ennitaskarenron, Ch. *chien branler le queue.*

Ennitsehȣa, *pance.* Ennitseho, *le ventre enflé.*
Kennihonnitsehȣagarate, *ventre gros comme celà.*

Ennitskȣah-re, *être assis sur quelque chose.*
Sennitskȣaren, *assis toy sur.*
Ennitskȣarakȣa, *ce sur quoy l'on s'asseoit.*

Eñon, *arriver*, S. ens, en, ensere; *a ql. accident bon ou mauvais.*
Hot iseñon hot isen? *Que t'est-il arrivera?*
In comp. usurpatur Jaȣeñon pro eñon.
Gaiataȣeñon, S. ens, en, ensere (*arriver à quelqu'un*).
Gaiataȣenseron, frequent.
Jotsannit sinni ȣagiataȣens, *chose étrange qui m'est arrivée.*
Θosnonte nahojataȣen, *il ne sait ce qui lui est arrivé.*
Θo gi ok neȣagiataȣen, *qu'il m'en arrive ce qui pourra.*
Jogenron sinni ȣagennigonraȣens, *Ce qui s'est passé dans mon esprit n'est pas à négliger.*

Eñon, in comp. ttum, *tomber;* ens, enne, ensere.
Gaiateñon, vide sup. in 2ª conj.
Ontahajatenne v. Eθojateñon, *il est tombé d'en haut.*
Extra comp. Aseñon, vide in 1ª conj. Sic
Enton, R. θa, θ, tanne; *faire tomber*, in comp.
Gaiatatenᶜton, R. *faire tomber quelqu'un.*
Ontahoñsajatent, *on l'a fait tomber d'en haut.*
Asenᶜton, extra comp.
Θosa tesasent, *Ne fais pas tomber cela.*

Ense, S. *f.* ens, *tomber à quelqu'un;* in comp.
Jaten te horihȣense, *Il ne s'oublie pas de l'affaire.*
Θosa tasarensens, *Ne laisse pas tomber ton chapelet.*
Extra com. Asense, S.
ȣagasense, *cela m'est tombé des mains.*

Ennon, *aller et venir.*
Ige v. iges, esc; v. Ises, ires, iȣes, &c. V. conj. *præt.* Iȣagennon, Jesennon, Ihaȣennon, Raȣennon.
Jejaȣenrion, *elle est allé.*

Ennoton, Ch. θa, t, tanne; *aller en quelque lieu.*
Sumit 2 ante personas, v. g.
Θo egeθa, *je vas là;* Neθo geneseθa, S. *vas en là.*
Jesȣs garonhiage jesaȣennonton, *Jésus est retourné au ciel.*

Ennonhȣeton, Ch. ts, t, θe; *coucher.*
Ennonhȣeθon, *aller coucher hors de sa cabane.*
Ennonhȣeti, R. *coucher chez quelq.;* sæpe in malam partem.
Ennonhȣeston, *le lieu où l'on couche.*
Ennonhȣetsion, S. *gister en voyage;* sions, si, sionhe.

Ennonna, *garder;* nàkȣe, *imp.* ne, nanne.
Gnonsannonnakȣe, *je gardois la cabane.*
Garihȣannonna, Ch. *garder, attendre l'issue d'une affaire.*
Est R. Hinnonna rokȣskoña, *je parde le petit garçon.*
Gannonnanni, R. *f.* nhas; *garder à quelqu'un.*
Tagnonsannonnhas, *garde moy ma cabane.*

Ennonton, Ch. *perdre patience, attendre quelq.;* tons, tong.
Θo^c^sa tesennontong, *Ne t'impatiente pas.*

Ennontonnion, Ch. *penser, juger.*
Enhontonnion^c^kon, Ch. *penser à q. chose.*
Jennontonnion^c^kȣa, *le jugement, la pensée, l'esprit.*

Ennoȣen, S. *être menteur;* v. Ennoȣenton, S. θa, t, tanne.
Ennoȣentanni, *f.* ten; *faire mentir quelq., luy imputer ce qu'il n'a pas dit.*
Atennoȣenton, Ch. *desmentir.* Est etiam R.
Θosa teskȣatennoȣent, *Ne me donne pas un dementy.*
Ronnoȣentannion, *qui ment toujours.*

Enrhar, *canons de porcelaine.*

Enron, S. rons, re, ronne; *laisser, omettre, rester.*
Assumit notam reit. v. local.
Θo ne tsisenron? *Combien t'en est il resté?*
Naie tsagaȣenron, *Voilà ce qui est resté.*
Skarihȣat eθorihȣenre, *Il omet une chose.*
Atatenron, S. *être resté.*
Gaieri naonsaotatenre, *il en reste 4.*
Atatenron, neut. *rester à quelqu'un.*

Enta v. **Ennisera**, *jour.* Θaȣentenhaȣiton, *qui a emmené le jour.*
Θentenhaȣiθa, *il apporte le jour.*
Etiaȣentonti, *demain.*

Entagon, S. *estre à jeun.*
Entagatste, S. *endurer long temps le faim; jeuner long temps.*
Entaon, S. *jeuner, souffrir la faim;* tas, tanne, tasare.
Jagaȣentas, *la famine.*
Entaston, *jeuner à cause de quelque chose.*

Entaon, in comp. *finir, s'user;* tas, tanne, tasere.
Garihȣentaon, *l'affaire finir.*
Garihȣentaton v. Garihȣentaston, *l'affaire finir par quelque chose.*

Entonni, Ch. nisk, ni, nianne; *s'ennuyer.*

Entonniaton, *faire ennuyer.*

Jaȣentônniat, *O qu'il ennuye bien ici!*

Atentonni, *être anéanti.* V. 1 conj.

Entiek, *midy.*

Entoraon, Ch. rha, ren, ronne; *avoir de la peine à travailler, trouver difficile, n'être pas laborieux.*

Entoraᶜkon, *avoir de la peine à cause de*

Atentoraᶜkon, Ch. *se peiner en vain pour q. chose;* kȣá, kȣanne.

Entoraᶜkȣanni, R. *f.* kȣen; *donner de la peine à quelq.*

Ensitaon, Ch. *brusler le poil de quelq. animal;* tas, taȣe.

Eȣe, *arriver.* V. conj.

Heren, Ahiren, *loin.*

Eren, Ch. *boire;* parum usitatum pro quo Ganᶜnegíren, de quocumq. liquor portabili.

ȣagnegiren geñie, *j'ai bu de l'huyle.*

Gannegiráton, *boire q. c. ou avec q. c.*

Erhar, *chien.*

Erie, *cœur*, S. extra comp.

N. raȣeri, *N. est mon cœur, je l'aime.*

Eriasa, in comp. V. Erienta, quamquam istud signat potius *pensée, esprit.*

Eriasannonagon, S. *avoir mal au cœur;* ks, g, χe.

Eriasentaon, S. *faire tomber son cœur,* seu *remercier quelqu'un de qui l'on a receu quelque grâce.*

Skat ongneri v. ongneriasont, *Nous n'avons qu'un même cœur.*

Neθo nonȣe si jongȣeriasontaken, *à l'endroit de notre cœur.*

Eriaté, S. *avoir du cœur.*

Tȣateriatikon, Ch. *être en colère.*

Erientȣannen, S *grand esprit.*

Erientakseñon, S. sens, sen, sensere; *être faché.*

Erientaksaton, S. *être faché pour q. c.;* θa, t, tanne.

Est etiam R. *facher quelqu'un.*

Aterientaksaton, R. *gaster l'esprit de quelqu'un.*

Erientare, R. tarhe, taren; *tenir l'esprit de quelqu'un; suspendre, troubler quelqu'un, l'interrompre.*

Aterientáre, S. *juger, estimer.*

Aterientajenton, Ch. *penser, examiner;* tons, ton, tonne, est R.

Aterientojentonᶜkon, *ce par quoi l'on pense.* Inde Tȣaterientajentonkȣa, *notre esprit, notre pensée.*

Aterientatsenrion, Ch. *avoir trouvé quelque invention, être inventif.*

Aterientiagon, Ch. *perdre l'espérance de quelque chose.*

Onne joterientiagon ȣatȣenheie, *C'en est fait, nous sommes morts sans ressource.*

Aterientiagi, R. *ôter l'esprit à quelqu'un.*

Aterientokte, Ch. θa, ten; *perdre l'espérance, être à bout de ses pensées.*

Erientoriannon, R. *aller divertir, distraire quelqu'un.*

Sagaȣerientoriannon gajenθoge hejagaȣennon, *Il est aller desennuyer ceux qui travaillent aux champs.*

Eri, *merîzier.*

Eron, igere, igerhakȣe, ȣageran, ȣagerhe, engerheg, *pensée, vouloir.*

Igere ahagitenre, *Je pense qu'il ayt pitie de moy.*

Es v. **Eson,** es, esonhag; *long,* in comp.

Garihȣes, *longue affaire.* Gannonses, *longue cabane.*

Gannateson^c^nen, *le village étoit long.*

Jons v. Jonsons, extra comp.

Θo najonsonhag, *De quelle longueur doit-il être?*

Ken nionsonsa, *un peu long.*

Esagon, Ch. ke, g, χe; *chercher.*

Gaiatisagon, R. *chercher quelqu'un.*

Esagi, R. acq. *chercher à quelqu'un.*

Tagȣesaks, *chercher moy,* v. g. *des poux.*

Eso, *beaucoup.* Esotsi, *multum nimis.*

Etage, *en bas.* Etageson, egatenti, *je marcherai par le chemin qui est dans le bois; jiray par terre.*

VERBA 4^ae^ CONJUGATIONIS.

Genheion, Ch. hons, heie, heionsere; *mourir.*

Genheiaton, Ch. θa, t, tanne; *mourir pour q. c.*

Gaiatagenheion, Ch. *être flasque.*

Gaiatagenheiaton, *être flasque, foible par q. c.*

Genheiase, R. *mourir q. c. à quelqu'un.*

Honna^c^kȣagenheiase, *sa femme luy est morte.*

Genhejonta, *moribond.*

Genheiontannonna, *garder un moribond.*

Θo niȣenhejontȣten, *Comment se porte le moribond?*

Ontatenheiontenhaȣi, *On apporte un malade.*

Gengȣite, *le printemps.* Gengȣitetsi, *au petit printemps.*

Geñie, extra comp. Gaienna, in comp. *huile ou graisse liquide.*

Geñieȣaton, Ch. θa, t, tanne; *faire de l'huile.*

Gaiennogȣan, Ch. *lever l'huyle ou graisse.*

Raȣejennagate, *il a beaucoup d'huile.*

Jaȣejennat, *il y a de l'huyle.*

Gaiennaronnion, *sali de l'huyle.*

Gannaie, *l'été passé.*

Oia tsi tgennaie, *Il y a deux étés.*

Gennaieson, *tous les ans.*

Gennhongon, R. ks, g, kse; *appeler quelqu'un.*

Gennhonkton, R. *l'appeler pour ou par q. c.*

Gennhonkson, R. *aller querir, appeler quel.*

Genstokȣa, *un paquet de hardes ou d'autres choses.*

Gent, usitatius Genton, *parler de quelqu'un.*
I hagiton, *C'est de moy qu'il parle.*
N. gitakȣe, *Je parlois d'elle.*

Ota, in comp. Genta, extra comp., vel Ota additur omnibus fere verbis irrisionis vel contemptus; *fiante,* v. gennita.
Ihentaks, *il mange de la fiente.*
Aχetario, *Que je batte leur fiente.*
ȣagennitatsennonni, *je suis heureux.*
Gentannonhȣeon, R. *aimer une gueuserie.*
Gentare, *il y a de la fiante.*

Gentáon, S. *dormir;* task, tahȣe, tasere v. taseg.

Gentágre. Ch. grakȣe, grek, granne; *être gisant.*
Rentagre, *il est gisant.* Ronnitagrakȣe, *jacebant.*
Gentagre, R. gre, gren, grende; *mettre au lit de quelq.*
Ken θo hensitagren, *Mets le coucher là.*
Ken sennitagren, *hic jaceas.*
Gentagráon, Ch. *tomber;* gras, granne, grasere.
ȣagitagranne, *Me voilà tombé.*
Rentagraseronne, *Il va tombant et retombant.*

Gentare, *poil rouge que l'on mets autour de la teste ou au col.*
Gentien, S. *porter au col q. c.*
Gentjasion, *oster de son col;* est R.

Gentenron, R. *avoir pitié de quelq.;* rhe, re, ranne.
Sumitur neut. estq. Parad. S.
Taonχen ongitenre, *O la bonne rencontre pour moy!*
ȣesentenre, *Ca été un bon jour pour moi.*
Gentenraton, *avoir pitié à cause de q.*
Naie skitenraθa, *Ideo misereris mihi.*
Atanditenron, S. *être miséricordieux.*
Atatitenron, Ch. *déplorer sa misère.*
Atatitenraton, Ch. *se consoler par q. c.*

Gentio^ckȣa, S. *troupe, assemblée.*
Gentio^ckȣate, *il y a là une troupe.*
Gentio^ckȣagohon, he, ha, hese; *aller querir une troupe.*
Ennitio^ckȣison, sas, sa, saanne; *s'assembler.*
Onne honnenditio^ckȣison, *on est assemblé.*
Ennitio^ckȣaχasion, *l'assemblée se finir, séparer.*

Genteron, ron, rontag; *être en quelq. lieu.*
Jeteron, *il y a quelqu'un.*
Genteronta^ckon, *être à quelqu'un.*
Genteron, R. *mettre q. c. animée en quel. lieu.*
Θo hetsiteron nhaksaa, *mets-la cet enfant.*
Genteronnon, R. *aller mener quelq.* ronne, ronna.
Tagiteronna, *viens moy mener.*
Genteronta^ckon, R. *mener quelq. avec q. c.*

Gentskare, S. *natte, avoir une natte.*
Gentskaron, *estendre, mettre la natte.*
Gentskaranni, R. *f.* rhas; *mettre une natte à quelq.*
Gentskaraᶜkon, *avoir pour natte q. chose.*
Ennitskare, Ennitskaraᶜkon, *avoir pour natte q. c.*

Gentskôte, Ch. *impf.* takȣe, tag, tasere; *être en quelq. lieu.*
Θo siskotag, *Sois, demeure là.*
Gentskotaᶜkon, *être en q. lieu pour q. chose.*

Gentsion, S. *poisson.* Gentsiagon, Ch. *en manger.*
Gentsiagohon, Ch. *en aller chercher.*

Kentsionᶜkon, Ch. *esternuer;* ka, g.
Te sentsionka, *tu esternues.*

Otsok, *blé qu'on groule dans les cendres;* extra comp.
Gentsokȣa, in comp.
Gentsokont, Ch. θa, ten, tanne; *en grouler.*
Gentsokontanni, R. *f.* θas; *en grouler à quelq.*
Tagitsokonθas, *groule moy de ce blé.*
Rentsokȣagatsθa, *le grand mangeur de blé groulé.*

Genθeon, S. θe; *être bête, sans esprit.*
Taonχenroθe, *O qu'il est beste!*
Genθeston, R. *rendre beste quelq.;* θa, ste.

Genθentéon, S. *être digne de compassion;* θa, te.
Ongiθente, *Je suis digne de compassion.*

I.

Verba quædam in I quæ entrant in compositionem, et sunt diversæ conjugationis.

I, *moi, nous 2, nous 3 ou plusieurs.*
Te jagniase, *nous deux.* Vide conj.

I, compositum signat plenitudinem; J, Jg, Jsere.
Gannonsi, *la cabane est pleine.*
Egannonsig, *la cabane sera pleine.*
Garihȣi, *présent complet.*

I, compositum solitudinem exprimit:
Agonha ate giati, *moy seul.*
Jennaie okti agaonhȣa ontatiatis, *Ceux-là sont superbes qui ne parlent que d'eux en racontant,* v. g. *quelque histoire.*

Ise, neutr. S. *s'emplir à quelqu'un.*
ȣagetsetisa, *ma courage mihi impleta est.*

Ise, R. act. *f.* is, Tagnatsis; *remplis moi ma chaudière.*

Innigenhon, in comp. ens, enn, enhȣe; *mettre dehors.*
Gaiatinnigenhon, *mettre dehors quelqu'un.*
Innigenhonse, R. acq. Tagiatinnigensoha, *mets moi cette bette,* v. g. *ce chien dehors.*
Asongȣasirinnigeris, *Il nous a enlevé une couverte.*

Innigeñon, ens, enn, ensere; *sortir de quelque lieu où on étoit caché*, v. g. *un enfant du ventre de sa mère.*

Ontahajatinnigenne, *Il est sorti du.* Innigense, R. acq. S. *sortir à quelqu'un.*

Jaȣetȣanni nongiatinnigense onnerenha, *Quantité de vers luy sont sortis du corps.*

Innion, *entrer.*

Ongieson ontagarakȣinnion, *Le soleil entre dans la chambre.*

Are^{c}ko jorihȣinnion, *La nouvelle n'est pas encore venu.*

Innionton, θa, t, tanne; *faire entrer, admettre.*

ȣahannakȣinniont, *Il fit entrer une pique.*

Jagoiarinnionton, *On a porté le sac là dedans.*

Gaiatinnionton, R. *faire entrer quelq.*

Inniontanni, R. *f.* ten; *introduire à quelqu'un.*

Io, in comp. ttum, *beau, bon.*

Gaiatio, *être beau.* Garihȣio, *bonne affaire.*

Horihȣio, *esprit bien fait, bon.*

Raȣendio, *Dominus est, vox ejus est pulchra* seu *vim magnam habet.*

Ioston, sθa, ste, stanne, in comp.

Gaȣendioston, R. *reconnoitre quelq. pour maitre;* θa, t, tanne.

Gaȣendiosta^{c}kon, R. *le reconnoitre maitre par q. c.*

Atȣendioston, Ch. *se faire maistre, seigneur de q. c.*

Atȣendiosta^{c}kon, Ch. *se faire maître par q. c.*

Garihȣioston, Ch. *credere quasi magni facere rem auditam.*

Rorihȣioston, *un chrestien.*

Garihȣiosta^{c}kon, Ch. *credere propter aliquid.*

Ionni, in comp. ttum, *s'advancer en pointe.*

Jongȣannenrionnihatie, *Nous allons comme en procession, les uns advancent devant les autres.*

Eθohajationni, *il est là gisant.*

Okti sajationni iaten satonrianneronsk, *Il est estendre tout de son long sans se remuer.*

Ionniaton, R. θa, t, tate; *estendre en long.*

Hetsiationniat, *Mets, étends-le de son long.*

Aetȣannenrionniat, *étendons, allongeons notre procession.*

Isen, in comp. ttum, *heurter.*

Gannhohȣisen, *frapper à la porte.*

ȣahogonretsisat, *Il a heurté sa main.*

Hannhohȣisonnionk, *Il ne fait qu'heurter à la porte.*

Itsaanni, R. *f.* isen; *piler à quelqu'un.*

Tagegakȣentisen, *pile-moy des poix.* Tagnogȣarisen.

It, R. in comp. *p.* & *f.* θa, taanne; *embarquer quelqu'un.*

Gaiatit, R. tagiatita, *embarque moy.*

Gaiatita^{c}kon, R. *embarquer dans quelq. vaisseau. pns.* kȣa, *f.* tak, *n.* takȣanne.

Eskiatitak no sahoñeja, *Tu m'embarqueras dans ton canot.*

Gaiatitakȣan, R. kȣas, kȣa, kȣanne; *débarquer quelqu'un.*

It, neutr. in comp. *être embarqué.* It, activum.
Satakȣendita, *embarque ses hardes.*
Itaanni, R. *embarquer à quelq. ses.*
Atit, pass. *p.* & *f.* θa, *n.* taanne; *s'embarquer.*
Atitacкon, takȣa, tak, takȣanni; *s'embarquér en q. c.*
Atitackȣan, kȣas, ko, kohe; *se débarquer.*
Atitakȣanni, R. *f.* kȣen; *se débarquer du canot du quelq.*

Itaχon, cum te divisionis in comp. *f.* tag.
ȣatȣagasinnitag, *J'ai froid aux pieds.*
ȣaθasinnitontago, *Il s'est gelé les pieds.*

Iton, inusit. pro quo Ioton, iot, iotonhag, iotonnen.
Neθo niot, *comme cela;* Θo niot, *pourquoy;* Hot gati niot, *cur;* Ok ken tiot, *comme cela;* Sate jot, *c'est tout de même.*
Ontajotonhatie si nahe, *Il va toujours de même depuis que.*

O.

O, inusitatum pro quo dic Iotó, *cela est enflé.* Eȣato, *cela s'est enflé.*
Atoose, S. *venir des enflures à quelqu'un.*
Ongȣátos, *il m'est venu une enflure.*

O, compositum. Sarasito, *tu as le pied enflé.*
ȣagatkonso, *j'ay le visage enflé.*

Oaȣie, *la rosée.* Ejoaȣiaθen egatenti, *Je partiray quand la rosée sera abbattue.*
Ongȣaȣiaks, *J'ay eu la rosée.*

Oge, *avoir des empoulles.* S.
Te ȣagasitoge, *J'ay des empoulles au pied.*

O, *y avoir ou mettre dans l'eau.*
Hinnon etkannego, *l'eau est bien basse.*
Garonto, *un arbre dans l'eau;* dela, *les canot de l'eau.*
Gahȣendo, *une isle.*
Igasco, de re vivente, *qui est dans l'eau.*

O signat etiam *être en un lieu humide.*
Gataro, *il y a de la terre.* Sic
Gannecrio te hagakarent, *Il y a une taye dans ton œil.* V. Honnesio, *il a,* parad. S.

Ohon, hos, ho, hose; *mettre dans quelq. liqueur.*
Jagonnonkȣatserohon, *On a mis, jette un sort dans.*
Hotihoñjohon, *Ils ont mis le canot dans l'eau.*
Gannatsiatogetonge esnennisnonsok onne jensataȣiatonnonsatogeti, *Tu mettras ton doigt dans le bénitier en entrant dans l'église.*
Nota ȣahaaronne, *Il va tendre un rets.*

Ohose, R. *f.* θhos. Tageθeserohos, *Mets moy de la farine au pot.*

Oón, os, oha, ohe; *tomber dans l'eau.*
Jaóon, *Celà est tombé dans l'eau.*
Gaskóon, *faire naufrage.* V. Ose, neutr. acq. S. *f.* os.
Ongȣahonros, *Mon fusil est tombé dans l'eau.*

Nota ȣationgȣarakos, *Le soleil nous a fait mal aux yeux.* Quæ habent te dualitatis quia duo sunt oculi.

Gaskose, neut. acq. S. *Une chose vivante tomber dans l'eau à quelq.*

Ogȣan, gȣas, go, gohe; *retirer de l'eau.*

Sogo, *tire de l'eau.* Snegogo, *retire l'eau.*

Atogȣan, dep. *se retirer de l'eau,* cum nota reit.

Ogȣanni, R. *f.* ogȣas; *tirer de l'eau à quelqu'un.*

Ogen, *impers.* on, *f.* ka, *n.* gasere; *faire eau.*

Onne ȣaoka sontak, *Ta chaudière fait eau.*

Ogen, pers. S. Onne ȣaongioχa, *Voilà que notre canot fait eau.*

Jaten te jongiogasere, *Nous n'aurons point d'eau.*

Ogen, *chercher des fruits de terre, pommes de terre.*

Jonχa, *on en cherche.* Ogennion, freq.

Tiogen, cum te, dual. signat intervallum sive aliquid medium.

Te gannosógen, *entre 2 cabanes.*

Te jaógen, Te jaontarógen, *Où il y a deux rivières qui se croisent, qui se rencontrent.*

Te joθahogen, *Où il y a 2 chemins fourchus.*

Tiogen, compositum, fit aliquando personale, v. g.

Te sȣannonsogen ne tsiarase N. ȣahoñario, *N. fût tûé entre ta cabane et celle de ton cousin.*

Ogennen (Huro), *dessous.* Garontogennen, *dessous un arbre.*

Ogerijon, *escailler, escosser fezoles, chataignes.* Ogeñjase, R. *f.* as.

Ogon, præpos. sub dessous. Gaskontorogon, *dessous l'écorce.*

Ogon, S. *être vuide, n'avoir rien.*

Raogon onsaraȣe, *Il est retourné à vide.*

Aogon iagȣaks, *Nous mangeons de la sagamité sans assaissonnement.*

Aagonge, *Il n'y a personne dans le village, dans la cabane.*

Ogoñaton, T. S. t, tanne; *racler, ôter le poil d'une peau.* Ch.

Kennihase gȣatserȣtakȣa jagogoñaθa, *Je viens emprunter le piquet sur lequel on racle la peau.*

Ohare, Ch. res, re, renne; *laver.*

Gaksohare, Ch. *laver un plat.* Extra comp. Gannohare, v. 1ae.

Oharese, R. *f.* res.

Ohâre, *emmancher.* Saserohâren, *emmanche la hache.*

Sroñaroharen, *emmanche l'alesne.*

Okaon, R. kas, ka, kaȣe; *graisser, huiler.*

ȣagoñjoka, *que je te graisse.*

Atokaon, Ch. *se graisser, s'huiler.*

Okȣiráon, S. ras, ra, rahȣe; *faire bouillie de la viande que l'on réserve pour les affaires.*

On, *donner,* R. Gatagon, *donne moy.*

Sagaon, *il leur a donné;* intrat etiam in comp.

Oñárate, *houe de bois.*

Ongie, *dans la cabane;* ongiason.

Ongóon, os, o, osere; *pénetrer, passer outre.*

Jaten te geȣennongos, *Ma voix ne pénetre pas, je parle en vain.*

Jaten te saȣennongos, *On n'entend plus sa voix; elle ne passe plus à travers*, v. g. *d'un enrouée.*

Ongoton, Ch. θa, t, tanne; *faire pénetrer.*

Ongotanni, R. *f.* ten; *faire pénètrer.*

Atongoton, Ch. θa, t, tanne; *passer outre, pénetrer.*

Ennonsongotannion, dep. *traverser les cabanes en les visitant.*

Atongotanni, R. *f.* ten; *passer outre devant quelq. en marchant.*

Atongota^{c}kon, *le lieu à travers lequel on passe.*

Tȣatiatongaton, S. *avoir le flus, aller du ventre.*

Te jagotiatongota^{c}kȣa onnon^{c}kȣat, *médecine purgative.*

Te jotiatongotanne ȣahorio, *le flus le tue.*

Ongoron, S. *avoir des soulèvemens de cœur, estre provoqué à vomir.*

Ongoriaton, S. *ce qui provoque à vomir.*

Ongȣe, *homme;* caret incrementis distinctivis temporum quæ supplentur per Igen.

Jaten songȣe tegen v. songȣesnon, *Comme si tu estois un homme, grand injure.*

Ongȣe, per antonomasion dicitur *d'une personne libérale, sage, irréprochable.*

Ongȣesera v. Ongȣeta, in compositione, *hommerie.*

J agongȣeta, *C'est ma créature, mon sujet.*

Hongȣeserio, *bel homme.* Hongȣetaksen, *laid homme.*

Hongȣetatsannit, *homme épouvantable.*

Ongȣetison, neutr. *être homme fait; p.* & *f.* sa.

Ongȣekȣannen, *estre homme fait depuis* 40 *à* 60 *ans.*

Onharon, Ch. rons, ron, ronne; *sarcler le blé.*

Onheȣen, Ch. *bàlier;* eȣas, eo. Jagonheȣaθa, *un balai.*

Tionharenron, *rendre malade.* Parum usitat pro quo Tȣatonharenron, S. *être en peine, en appréhension de quelque malheur;* ronsk, ron, ronne.

Tȣatonharenron^{c}kon, S. *être en crainte à cause de q. chose.*

Onhȣa, *seul*, S. Agonhȣa, sonhȣa.

Onhȣentsia, *terre*, S.

Diȣ raonhȣentison, *Dieu a fait la terre.*

Onhȣentsiannentágon, Ch. *Attacher son pays à un autre, demeurer ailleurs.*

Atonhȣentsiannenta^{c}sion, *Quitter son pays pour aller ailleurs demeurer, s'établir.*

Atonhȣentsionni, S. *Avoir besoin de q. c. de valeur qu'on a peine de trouver.*

Jotenhȣentsiohon najontenti, *On ne trouve personne pour partir.*

Onkaron, *ronfler;* ronsk, ron, ronne.

Onnegon, Ch. *retirer, éloigner q. chose.*

Atonnegon, Ch. kȣe, k, kse; *se retirer, s'éloigner.*

Satonnek, *retire toi.*

Ontereon v. **Onteron**, Ch. res, re, resere; *accorder, consentir.*

Onnha, *vie.* Onnhio, *vie qui est pour durer.*
Onhegatste, S. *avoir de la vie dure.*
Atonnhegatste, *être bon ménager.*
Onnhongennion, R. *surmonter la vie de quelq.;* nies, ni, nionhe.
Onnhe, Ch. *impf.* nhekȣe; *f.* nheg, *vivre.*
Diȣ songionnhekesie, *Dieu nous va donnant la vie.*
Onnhekon, *impf.* konnen; *vivre pour q. c. ou par q. c.*
Onnaie tionnhekon sirere Raȣendio ajongeȣennarakȣag, *La cause pour quoy nous vivons c'est que Dieu veut qu'on lui obéisse.*

Onnheson, sons, es; *avoir longue vie.*
Onnheston, *prolonger la vie.*
Naie jongionnhestonhatie, *hoc producit vitam nostram.*
Onnheton, R. ts, t, θe; *donner la vie.*
Onnheton, cum redup. *résusciter quelqu'un.*
Atonnheton, *avoir la vie.* Ch.
Jaten te agrihȣanderen si nahe etȣagasonnheton, *Non peccavi a nativitate mea.*
Atonheton, cum reit. *résusciter.* Atonnhatention, *mourir.*
Tȣatonnhakarien, Ch. rias, ri, rihe; *être misérable, souffrir.*
Tȣatonnhakariakton, R. θa, t, tanne.

Onnion, Ch. nisk, ni, nianne; *faire, être cause.*
Onnianni, R. *f.* nien; *faire à quelqu'un.*
Garihonnion, Ch. *être la cause.*
Naie ȣagarihonni, v. Naie ȣahonni, *C'est parceq.*
Garihonnianni, R. *f.* nien; *enseigner quelqu'un.*
Atrihonnianni, Ch. *s'instruire.*

Onnjon, fit rel. quando refertur ad 1am personam, v. g.
Jojandere ȣasongionni, *Il nous a mit à notre aise.*
Otkon esongionni, *Il nous rendra esprits.*
Songȣannaskoni, *Il nous a fait esclaves.*
Atonni, *être fait naître.*
Hotonnia, *petit enfant qui est né devant le temps.*
Atonni, S. *avoir des parents du côté de son père.*
Atonnisen, S. *imp.* takȣe, *f.* tak.
Atatonni, recip. Otkon hotatonni, *Il s'est fait démon.*
Otkon songȣatatonnianni, *Nobis factus est dæmon.*
Atatonnianni, recip.

Onniaton, *employer q. c. à en faire une autre.*
Onneja gannonsonniaton, *cabane faite de pierre.*
Item cum partic. Skati signat *tourner de l'autre côté.*
Skati sonniat, *Fais tourner de l'autre côté.*
Atonniaton, Ch. *Naître en un tel temps ou lieu.*

Onni, adverb. *aussi,* conjunc. Igere onni, *Je veux aussi.*

Oncnia, *pointe de terre.* Oncniate, *il y a une pointe.*]
Ti oncnionni, *pointe qui advance sur la rivière.*
ȣahatonniatase, *il a fait le tour de la pointe.*

Onnison, Ch. *faire;* sas, sa, saanne.
Onnônni, S. nos, nonne, nosere; *iïonder, être gagné de l'eau.*
Onne ȣaongionne, *L'eau nous va gagner, entre chez nous.*
Onᶜdȣton, S. *avoir de l'eau, être profond.*
Honnendȣton, *L'eau entre dans la cabane.*
Θo niondȣtes, *De quelle profondeur est?*
Onneñon, *s'affaisser,* in comp.
Joȣiseronneñonhatie, S. ige; *La glace s'affaisse sous mes pieds.*
Gannonseñon, *cabane s'affaisser.*
Onnonhȣenha, *la fleur du blé.*
Onȣesaon, S. sas, sa, sasere; *être aisé, se rejouir.* Onȣesaseron, freq.
Jonȣesen garonhiage, *Il fait bon; on est bien content au ciel.*
Onȣeskȣanni, sumpt. neutr. est Parad. S. *f.* ken; *être content.*
Onȣeskȣaton, *agréer à cause de q. chose.*
Jaonȣeskȣat nontrendajensk, *Il y a du plaisir à prier.*
Onȣeskȣanni, *est* aliquando rel.
Jaten te hiatonȣeskȣanni, *Je ne l'agrée pas.* Atatonȣeskȣanni, recip.
Ajontatoneskȣen onne ȣagonniag, *Ceux qui se marient devroient s'entreaggréer.*
Onȣeskȣanniton, S. *p.* & *f.* θ, tanne; *agréer à cause de q. chose.*
Ongȣeton, R. *décourager quelq.* Vix in usu, θa, t, tanne.
Ongȣetaᶜkon, R. kȣa, k, kȣanne; *faire perdre courage.*
Atongȣeᶜton, dep. *perdre courage.* Ch.
Atongȣetanni, R. *f.* ten; *perdre courage à l'occasion de q. chose.*
Onria, *haleine.*
Atonrion, Ch. ries, ri, rionne; *respirer.*
Atonrieton, θa, t, tanne; *respirer avec q. chose.*
Naie gatonrieθa Jesȣs ȣaθennonhȣeron, *Je ne respire point que pour invoquer Jésus.*
Atonnajen, *faire le hé, hé.*
Atonriajenni, R. *f.* enhas. V. in 1ª conj.
Onrisera, *haleine, souffle.*
Seg aesonriserannirha nange, *A fin que tu sois fort d'haleine.*
Ti onriserakȣan, cum te affirm. *N'en pouvoir plus.*
Usitatius Atonriserakȣan, cum te affir. *perdre haleine de foiblesse.*
Atonrisen, Ch. ens, en, enne; *se reposer.*
Atonrisenton, *se reposer souvent.*
Atonrisentaᶜkon, Ch. *lieu où l'on se repose.*
Atonriserongoton, Ch. *respirer.*
Onsennon, S. *se plaindre* (d'un malade), nha, nn.
Ont, *être.* Semper postponitur vocabulis nec dicitur extra comp.
Gannhohont, *il y a une porte.* Te hasitont, *il a 2 pieds.*
Garihont, *avoir quelq. liaison, rapport.* Jaten te tsiorihant.
Ont, *faire être.* Tȣajatagȣegon songȣajatison Diȣ, agȣegen ȣasongȣagonsonten, ȣasongȣanuentsonten, &c. *Dieu a fait tout notre corps, notre face, nos bras, &c.*
Sennhohonten, *faire une porte.*

Ontacкon, postpositam voci signat *être de la forme morale* ou *physique d'un autre; impf.* konnen, *f.* kong, konhag.

Gannakȣa hondigonrontagon, *Il a l'esprit rempli de.*

Ganniegehage raȣennontagon, *Il parle la langue d'Agnier.*

Ongȣe gagonsontacкon gario, *Un animal qui a la face d'homme.*

Otkon gaiatontakon, *Il a la forme d'un démon.*

Garihȣa rajatontakon, *homme d'affaire.*

Ontakon, takȣa, tak, takȣanne; *donner à q. chose la forme morale ou physique; faire à q. chose par le motif d'un autre.*

θosa gannakȣa tesrihontacк neθo nensiere, *Quand tu feras ainsi, ne le fais pas par le motif du plaisir déshonnête.*

Gannakȣa harihontakȣa, *Il fait allusion en parlant aux choses sales.*

Atrendajent hoñandigoncrontakon nonaieña, *Ses parents l'ont accoûtumé à prier.*

Ontakȣanni, R. acq.

Ongȣe songȣatiatontakȣanni notkon, *Le démon nous a paru en forme humaine.*

Ont, *mettre au feu;* θa, ten, tanne. Ontanni, R. *f.* θas.

Gannataront, S. θa, ten, tanne; *mettre du pain au four, au feu.*

Atnataront, S. *mettre du pain au feu pour soi.*

Tagnonkȣeñonθas, *Fais moi rôtir un épy.*

Onθon pro Ontacкon, θosk, θo, θosere; *faire être dans le feu.*

Sonθo, *mets au feu.* Sȓentonθo, *mets du bois au feu.*

Onθanni, R. *f.* θas; *mettre cuire pour quelq.*

Ontak, S. *chaudière*, extra comp.

Ontak onȣe, *chaudière de terre.*

Ontak jotsogri, *chaudière ronde.*

Ontaȣeton, *trembler;* θa, t, tanne. Gaiatontaȣecton, Ch. *frissonner.*

Garistontaȣecton, Ch. *sonner une cloche.*

Jaontaȣeθa raondigonra, *Son esprit n'est pas rassurè; il tremble de peur.*

Ontarhéon, neut. *entrer, s'accrocher.*

ȣagatonkontarhenne rajatagon genha, *La flamme entra, s'attacha à son corps.*

Gaiatontarheon, *une chose vivante s'accrocher.*

Ontarheton, neut. S. *faire entrer.*

ȣahonnenstontarhet, *Il s'est fait entrer un grain de blé,* v. g. *dans le nez.*

Ontentáon, Ch. tas, taȣe, tasere; *brusler les champs.*

Ontecton, cum reitr. θa, t; *se trouver mieux.*

Jaten te tsiaonteθa, *On est très mal* (est R.).

Jaten te sȣagontetannen, *Je n'en pouvois plus.*

Oreñon, in comp. rens, renne, rensere; *trouver.*

Garihoreñon, Ch. *trouver l'affaire.*

Gaiatoreñon, *trouver quelqu'un.*

Tioren, *fendre;* ens, en, ensere. Tiorenseron, frequent.

Tȣatoren, pass. *être fendu;* utriusque parad.

Orianneron, ronsk, ron, ronne; *se mouvoir.*
Atorianneron, Ch. *se remuer, se deffendre.*
Atorianneron[c]kon, Ch. *p.* & *f.* kȣa; *ce que fait mouvoir.*
Oron, *être sali de q. chose.*
Jaoronnion onnonkȣat, *Cela est infecté, sali par la médecine.*
Gaiataron, S. *Une chose vivante être sali.*
Orongȣan, Ch. *ramasser, recueillir.*
Osa, S. *robbe.* Osonni, Ch. *faire une robbe;* v. Osaon, Ch. sask, sa, saanne.
Tsiosat tsonnito, *Une robe de castor,* id est 6 *castors.*
Osera, *hyver.* Tioseriagon, S. ks, g, χe; *passer l'hyver.*
Ejongioserannoron, *Nous aurons peine de passer l'hyver.*
Tioserongoton, S. *idem.*
Iotoseratsannit, *hyver épouvantable.*
Oseraton, S. ts, t, θe; *l'hyver venir.*
Onne ongioserat, *Nous voilà dans l'hyver.* Oseraton, imperson.
Jaten te joserat garonhiage, *Il n'y a point d'hyver au ciel.*
Oseragi v. Koserhenne, *dans l'hyver.*
Atoseron, S. depon. rons, ron, ronne; *hyverner.*
Oserhon, rast, raȣe; *Mettre de l'eau dedans, inficere aliquem,* in comp.
Aetȣahoñoseraȣe, *Mettrons de l'eau dans le canot.*
Eskȣagenroseraȣe, *Tu me gâteras de cendres.*
Oseragexan, ȣas, ȣà, ȣahȣe; *nettoyer, laver quelq.*
Est R. Tagiatoserageȣe, *lave, nettoye nous.*
Otarhon, Ch. hosk, ho, hosere; *accrocher.*
Garihȣtarhon, Ch. *l'affaire être accrochée.*
Otarhose, neutr. acq. S.
Ongȣaserotarhos, *Ma hache s'est accrochée.*
Atiatotarhon, *Se retirer pour occuper moins de place.*

SEVENTEENTH ANNUAL REPORT

OF THE

Regents of the University of the State of New York,

ON THE CONDITION OF THE

STATE CABINET OF NATURAL HISTORY,

AND THE

HISTORICAL AND ANTIQUARIAN COLLECTION ANNEXED THERETO.

Made to the Legislature April 4th, 1864.

ALBANY:
COMSTOCK & CASSIDY, PRINTERS.
1864.

State of New York.

No. 189.

IN ASSEMBLY,

April 4, 1864.

SEVENTEENTH ANNUAL REPORT

OF THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK, ON THE CONDITION OF THE STATE CABINET OF NATURAL HISTORY, AND THE HISTORICAL AND ANTIQUARIAN COLLECTION ANNEXED THERETO.

UNIVERSITY OF THE STATE OF NEW YORK,
OFFICE OF THE REGENTS,
ALBANY, *March 24th*, 1864.

To the Hon. THOMAS G. ALVORD,
Speaker of the Assembly:

SIR—I have the honor to transmit the Seventeenth Annual Report of the Regents of the University, on the State Cabinet of Natural History, and the Historical and Antiquarian Collection annexed thereto.

I remain, very respectfully,
Your obedient servant,
JOHN V. L. PRUYN,
Chancellor of the University.

REPORT.

To the Legislature of the State of New York,

The Regents of the University Respectfully Report:

The contents of the Cabinet are, in general, in excellent condition. The additions to them during the past year by purchase and by gift, including a few which were casually omitted in the last report, are set forth in an accompanying schedule.

The Curator has collected and added to the Palæontological department, a number of valuable fossils from the Silurian formation, and from the upper and lower Helderberg rocks.

Dr. Torrey's Flora of the State was published as a portion of the Natural History of the State, in 1843. In it he described 1449 Phænogamous and fifty-nine Cryptogamous plants, consisting of Equisetaceæ, Ferns, Lycopods, and Hydropterides. In 1853, he made the Catalogue of these plants, adding thereto twenty-nine subsequently discovered Phænogamous plants. From this Catalogue, at least eight of the Phænogamia should be deducted for species admitted into the Flora upon mistaken information, and for varieties then regarded as species; and one of the Cryptogamia, the Salvinia natans, attributed to the State by Pursh, has not been found in the United States since his time. In 1853, the species known to be spontaneous in the State were fourteen hundred and seventy Phænogamous, and fifty-eight Cryptogamous ones, exclusive of the Fungi, mosses, &c. But a large number of species not included in the Catalogue of 1853, have been found growing spontaneously within the State, and there is every reason to believe that faithful examinations, especially of Long Island, the southern tier of counties, and the northeastern portion of the State, will add largely to our Flora.

In preparing the Herbarium, which was designed to be a full exponent of the State Flora, Dr. Torrey was unable to procure specimens of some of the plants included in it. These deficiencies are noted in the Catalogue of 1853, and in the main continue unsupplied. The Herbarium has slightly suffered by time and

use. The standing Committee of the Regents on the Cabinet, on the recommendation of Dr. Torrey, employed Mr. C. J. Austin to examine the Herbarium critically, and to report its deficiencies by a Catalogue exhibiting them. Mr. Austin seems to have been thorough in his examination, and the list of deficiencies appended to the circular in the appendix, was drawn mainly from a full Catalogue prepared by him. It exhibits with precision the deficiencies of the Herbarium in respect to the plants known to be of the State in 1853, and in respect to subsequently discovered ones; and points out others which there is reason to believe exist within the State, though they have not yet been found. Where a specimen in the Herbarium is so poor that it ought to be replaced, the species is included in the list of deficiencies.

The Cabinet is more or less incomplete in other departments. Lists of the deficiencies in some of these departments, are appended to the circular, and measures are in contemplation to ascertain the precise condition of the Cabinet as an exponent of the Natural History of the State in all its branches.

The Cabinet is an honor to the State — affords instructive pleasure to the people, and is a standing aid to science. To perfect and make it more eminently useful, the attention of the Naturalists of the State should be attracted to it, and their free aid invoked. That their co operation can be easily secured, we do not doubt. Indeed the Buffalo Society of Natural Sciences has volunteered its aid, and we have assurances of active co-operation from Naturalists in various portions of the State. Entertaining these views, the Regents have caused the annexed circular to be prepared, and have appended thereto the lists of deficiencies above referred to, intending to diffuse it among the Naturalists of the State, and send it to the officers of every College, and to the Principal of every Academy, subject to their visitation.

We also transmit herewith a preliminary list of the Plants of Buffalo and its vicinity.

The Regents propose also, after due inquiry, to initiate more effective measures for the formation of a collection expressive of the economical geology of the State.

JOHN V. L. PRUYN,
Chancellor of the University.

ALBANY, *March* 24, 1864.

APPENDIX.

CONTENTS OF THE APPENDIX.

(A.)

UNIVERSITY OF THE STATE OF NEW-YORK.

OFFICE OF THE REGENTS.

ALBANY, 1864.

SIR :

THE Regents desire to perfect the State Collections of Natural History, and make them as useful as possible to men of science as well as to the people. They are sensible that the free and zealous co-operation of the naturalists of the State is absolutely necessary to the attainment of these objects. Even with such co-operation, the work must be pursued for years. They respectfully invite you to co-operate with the many men of science, in different portions of the State, who have tendered their assistance.

The Cabinet does not include all the mammals, nor birds, nor reptiles, nor amphibia, which are natives of the State. It is deficient also in the fishes and mollusks, and does not include anything which deserves the name of a collection of our insects. The Regents send you imperfect lists of the deficiencies in some of these departments; and they invite the naturalists of the State to aid these departments, by sending to the Secretary of the Board, at Albany, whatever they may deem new or rare.

In reference to the preparation of shells for transmission, the animal can be readily removed after a short immersion in boiling water. Reptiles and fishes should be put in common whiskey, and forwarded at once. Mammals and birds, intended to be set up, should never be packed in close boxes : the air should have free access to them. Many animals, intended for the Cabinet, have been rendered worthless by close packing. Mammals are, generally, in the best condition for setting up, in November & December.

But the immediate aim of the Regents is to restore and perfect the State Herbarium. That you may understand its condition, they append hereto a list of its actual and supposed deficiencies. It would be comparatively easy to supply them, if inferior specimens were admissible. The Herbarium, even as it is, is invaluable; being, so far as it extends, connected with the Natural History of the State, that glorious contribution of New-York to science — a collection of specimens prepared, or sanctioned, by Dr. TORREY, as true examples of the plants described in his Flora of the State. To contribute to that Flora will, the Regents doubt not, be considered an honor by every worthy botanist.

The paper of the herbarium is seventeen and a half inches by twelve, and it is desirable that the specimens should be of suitable dimensions: they ought, when the plant is small and the root manageable, to embrace the root. If possible, every species ought to be fully exhibited, by specimens both in flower and in fruit, and in all its varieties. The appended list very seldom refers to a variety, but every variety is desired. Thus, the list includes *Aster miser*; but that *Aster* exhibits at least four well-marked varieties, all of which are wanting in the State Herbarium. Every specimen should be properly displayed and dried. A well displayed specimen exhibits as much as possible of what is botanically important. To be well dried, the specimen should be dried quickly, thoroughly, and under proper pressure. To dry it quickly, the botanist should use plenty of drying papers and a proper weight — a weight that will press very hard, and yet not crush. The Asters, Solidagoes, and many other Compositæ, can hardly be too heavily weighted. A screw press ought not to be used.

You are requested to send to the Cabinet whatever you may think proper. The Regents will be glad to receive specimens of any or all the plants of your vicinity, but especially of such as are indicated in the list, and such others as are not credited to the State by the Catalogue of 1853 or by the books. If the botanists of the State send liberally of the plants peculiar to their neighborhoods, the Regents may be able to distribute the duplicates among those who need them. It is in contemplation of such a contingency that you are requested to furnish, not only a full list of all the plants known by you to grow spontaneously in your vicinity, but also a list of any plants you may desire from other portions of the State.

The list of your plants may, profitably, distinguish them as native and naturalized, garden or culture weeds (i. e. spontaneous only in gardens or ploughed fields) and garden or culture scapes; and also state the time of flowering and of fruiting. Each specimen, or set of specimens, should be accompanied by a label, containing your name, addition and residence, and the station or locality of the specimen. If the plant go into the herbarium, the label will go with it.

With the aid of these local catalogues, and the free assistance of our botanists, the Regents expect to be able to have a full catalogue of the Flora of New-York prepared; one which will be useful to you, creditable to the State, and acceptable as a contribution to science.

Every contribution to the Cabinet will be duly mentioned in the Regents' Annual Report of its condition.

Communications and packages should be addressed to the undersigned.

By order.

S. B. WOOLWORTH,

Secretary of the Regents.

DEFICIENCIES IN THE STATE CABINET.

A. List of Deficiencies in the Mammalia, Birds, Reptiles and Amphibia, inhabiting the State, or which formerly inhabited it and are, or are supposed to be, extinct.

Note. The letter m, or f, when added to the common name, denotes that the deficiency is of the male or female animal; and when neither letter is so added, the deficiency is total.

MAMMALIA.

1. Vespertilio pruinosus,	*Hoary Bat.*
2. Sorex brevicaudus,	*Short-tailed Shrew.*
3. Sorex parvus,	*Small Shrew.*
4. Sorex fosteri,	*Foster's Shrew.*
5. Sorex carolinensis,	*Carolina Shrew.*
6. Otisorex platyrhynchus,	*Broadnosed Shrew.*
7. Gulo luscus,	*Wolverene.*
8. Mustela martes,	*American Sable.*
9. Mustella pusilla,	*Small Weasel.*
10. Mustella fusca,	*Brown Weasel.*
11. Lyncus borealis,	*Northern Lynx.*
12. Lyncus rufus,	*Wildcat*, or *Bay Lynx.*
13. Stemmatopus cristatus,	*Hooded Seal.*
14. Meriones americanus,	*Deer Mouse.* m.
15. Mus rattus,	*Black Rat.*
16. Mus leucopus,	*Jumping Mouse.* m.
17. Arvicola riparius,	*Marsh Meadow-mouse.*
18. Arvicola oneida,	*Oneida Meadow-mouse.*
19. Arvicola alborufescens,	*Light-colored Meadow-mouse.*
20. Arvicola xanthognathus,	*Yellowcheeked Meadow-mouse.*
21. Elaphus canadensis,	*American Stag*, or *Elk.*
22. Rangifer tarandus,	*Reindeer.*

BIRDS.

1.	Cathartes aura,	*Turkey Buzzard.*
2.	Nauclerus furcatus,	*Swallow-tailed Hawk.*
3.	Strix pratincola,	*American Barn-owl.*
4.	Troglodytes americanus,	*Wood Wren.*
5.	Vermivora swainsoni,	*Whistling Warbler.*
6.	Vermivora peregrina,	*Tennessee Warbler.* f.
7.	Sylvicola blackburnia,	*Blackburnian Warbler.* f.
8.	Sylvicola castanea,	*Baybreasted Warbler.* m.
9.	Sylvicola americana,	*Blue Yellowbacked Warbler.* m.
10.	Sylvicola parus,	*Hemlock Warbler.*
11.	Muscicapa acadica,	*Small Greencrested Flycatcher.* m.
12.	Muscicapa flaviventris,	*Yellowbellied Warbler.* f.
13.	Muscicapa virens,	*Wood Pewee.* m.
14.	Vireo solitarius,	*Solitary Greenlet.* f.
15.	Garrulus canadensis,	*Canada Jay.*
16.	Emberiza lincolni,	*Bluestriped Bunting.*
17.	Linaria borealis,	*Mealy Redpoll.*
18.	Picus hirsutus,	*Banded Woodpecker.*
19.	Picus auduboni,	*Audubon's Woodpecker.*
20.	Ectopistes carolinensis,	*Carolina Turtle-dove.*
21.	Meleagris gallipavo,	*Wild Turkey.* f.
22.	Charadrius virginicus,	*Golden Plover.*
23.	Strepsilas interpres,	*Turnstone.*
24.	Hæmatopus palliatus,	*American Oystercatcher.*
25.	Ardea virescens,	*Green Heron.*
26.	Ardea exilis,	*Small Bittern.*
27.	Numenius hubsonicus,	*Jack Curlew.*
28.	Tringa maritima,	*Purple Sandpiper.*
29.	Tringa cinclus,	*Blackbreasted Sandpiper.*
30.	Tringa canutus,	*Redbreasted Sandpiper.*
31.	Tringa schinzi,	*Schinz's Sandpiper.*
32.	Limosa fedora,	*Marlin.*
33.	Rallus elegans,	*Freshwater Meadowhen.* f.
34.	Phalaropus fulicarius,	*Red Phalarope.*
35.	Lobipes hyperboreus,	*Hyperborean Lobefoot.*
36.	Holopodius wilsoni,	*Wilson's Holopode.*
37.	Phalacracorax carbo,	*Cormorant.*
38.	Sterna arctica,	*Arctic Tern.*
39.	Sterna cantiaca,	*Sandwich Tern.*
40.	Sterna dougallii,	*Roseate Tern.*
41.	Sterna anglica,	*Marsh Tern.*
42.	Larus sabini,	*Forktailed Gull.*
43.	Larus tridactylus,	*Kittiwake*, or *Threetoed Gull.*
44.	Lutris buffoni,	*Arctic Hawk-gull.*
45.	Fuligula histrionica,	*Harlequin Duck.* f.
46.	Fuligula spectabilis,	*King Duck.*
47.	Fuligula mollissima,	*Eider Duck.* f.
48.	Fuligula fusca,	*Whitewinged Coot.*
49.	Fuligula perspicillata,	*Surf Duck* or *Coot.*
50.	Fuligula labradora,	*Pied Duck.*
51.	Anas penelope,	*European Widgeon.*
52.	Anser albifrons,	*Whitefronted Goose.*
53.	Anser hutchinsi,	*Hutchins's Goose.*
54.	Cygnus americanus,	*American Swan.*

REPTILES.

1. CHELONIA MIDAS,	*Green Turtle.*
2. SPHARGIS CORIACEA,	*Leather Turtle.*
3. TRIONYX FEROX,	*Softshelled Turtle.*
4. EMYS RUBRIVENTRIS,	*Redbellied Terrapin.*
5. EMYS MUHLENBERGII,	*Muhlenberg's Tortoise.*
6. EMYS GEOGRAPHICA,	*Geographic Tortoise.*
7. EMYS PSEUDOGEOGRAPHICA,	*Pseudogeographic Tortoise.*
8. KINOSTEMON PENNSYLVANICUM,	*Mud Tortoise.*
9. STERNOTHÆRUS ODORATUS,	*Musk Tortoise.*
10. CISTUDA BLANDINGII,	*Blanding's Box-tortoise.*
11. SCINCUS FASCIATUS,	*Bluetailed Skink.*
12. CALAMARIA AMŒNA,	*Red Snake.*
13. TRIGONOCEPHALUS CONTORTRIX,	*Copperhead.*

AMPHIBIA.

1. SCAPHIOPUS SOLITARIUS,	*Hermit Spadefoot.*
2. HYLODES PICKERINGI,	*Pickering's Hylode.*
3. HYLODES GRYLLUS,	*Cricket Hylode.*
4. SALAMANDRA SALMONEA,	*Salmon-colored Salamander.*
5. SALAMANDRA FASCIATA,	*Blotched Salamander.*
6. SALAMANDRA LONGICAUDA,	*Longtailed Salamander.*
7. SALAMANDRA BILINEATA,	*Stripedbacked Salamander.*
8. SALAMANDRA COCCINEA,	*Scarlet Salamander.*
9. SALAMANDRA GLUTINOSA,	*Bluespotted Salamander.*
10. TRITON TIGRINUS,	*Tiger Triton.*
11. MENOPOMA ALLEGHANIENSIS,	*Allegany Hellbender.*

B. Deficiencies in the Herbarium.

NOTE. * indicates that specimens in fruit, or the fruit is wanting;
† " " in flower are wanting;
§ " " with the root are wanting.

The specific names of plants described in Professor TORREY's Report, but of which no specimens, or very poor ones, exist in the Herbarium, are printed in ordinary type; and the specific names of a few of the plants not described in the Report, but known, or confidently believed, to be plants of the State, and not in the Herbarium, are printed in italics.

LIST OF DEFICIENCIES OF THE STATE HERBARIUM.

ANEMONE nemorosa.*
RANUNCULUS flammula.
RANUNCULUS repens, *v.* marylandicus.*
TROLLIUS laxus.§
COPTIS trifolia.*
HELLEBORUS viridis.*
MAGNOLIA *umbrella.*
LIRIODENDRON tulipifera.*
ASIMINA triloba.*
PODOPHYLLUM peltatum.*
BRASENIA peltata.*
NELUMBIUM luteum.*
NYMPHÆA odorata.*
NUPHAR kalmiana.*
" advena.*
DICENTRA cucullaria.*
" canadensis.*
" eximia.*
NASTURTIUM *officinale.*
" *armoracia.*
" lacustre.*
TURRITIS stricta.
" *glabra.*
ARABIS hirsuta.
DENTARIA diphylla.§
" maxima.
SINAPIS nigra.
" alba.
CAMELINA sativa.
THLASPI arvense.
RAPHANUS sativus.
VIOLA selkirkii.
" pubescens.†
PARNASSIA caroliniana.
ASCYRUM stans.
" *crux-andreæ.*
HYPERICUM pyramidatum.
STELLARIA media.
" longifolia.
" longipes.
" borealis.
CERASTIUM vulgatum.
" viscosum.
" oblongifolium.
SILENE *inflata.*
" *armeria.*
LYCHNIS *vespertina.*
VACCARIA vulgaris.
RESEDA *luteola.*
" *odorata.*
" *alba.*
MALVA sylvestris.
" *moschata.*
KOSTELETZKYA virginica.
LINUM virginianum.
" boottii.
" usitatissimum.
RHUS glabra.
" venenata.
" aromatica.†
PTELEA trifoliata.*
ACER spicatum.†
" dasycarpum.†

EUONYMUS obovatus.
RHAMNUS catharticus.
" alnifolius.
CEANOTHUS ovalis.
VITIS æstivalis.†
" cordifolia.†
POLYGALA cruciata.
" *ambigua.*
" *brevifolia.*
" lutea.
VICIA caroliniana.
ROBINIA pseudacacia.†
TRIFOLIUM *procumbens.*
MEDICAGO sativa.
" *maculata.*
GLYCYRRHIZA *lepidota.*
ASTRAGALUS *robbinsii.*
" *alpinus.*
DESMODIUM *pauciflorum.*
" *humifusum.*
LESPEDEZA *stuvei.*
GENISTA tinctoria.
LUPINUS perennis.*
BAPTISIA tinctoria.*
" australis.
CERCIS canadensis.
GYMNOCLADUS canadensis.*
PRUNUS americana.*
" pumila.*
" serotina.*
SPIRÆA aruncus.
GEUM virginianum.
" *album.*
AGRIMONIA eupatoria.
" *parviflora.*
FRAGARIA vesca.*
CRATÆGUS tomentosa, *v.* pyrifolia.
" " *v.* parvifolia.
PYRUS malus.
" communis.
AMELANCHIER canadensis :
v. rotundifolia.
v. alnifolia.
v. oligocarpa.
RHEXIA virginica.§
AMMANNIA humilis.
LYTHRUM hyssopifolia.
CUPHEA viscossissima.
EPILOBIUM molle.
ŒNOTHERA linearis.
" chrysantha.
CIRCÆA alpina.
MYRIOPHYLLUM spicatum.
" verticillatum.
" heterophyllum.
" ambiguum.
MYRIOPHYLLUM tenellum.
RIBES cynosbati.
" *hirtellum.*
" *rubrum.*
" prostratum.
TILLÆA simplex.
SEDUM telephioides.
" *acre.*
HEUCHERA americana.
HYDROCOTYLE interrupta.
SIUM latifolium?
THASPIUM aureum.
" trifoliatum.
PANAX quinquefolium.§
" trifolium.§
CORNUS (all the species in fruit).
LONICERA grata.
" flava.
" ciliata.
" cœrulea.
" oblongifolia.
SAMBUCUS pubens.*
VIBURNUM nudum.
" pauciflorum.†
GALIUM lanceolatum.
MITCHELLA repens.
OLDENLANDIA glomerata.
EUPATORIUM hyssopifolium.
" album.
" rotundifolium.
" *pubescens.*
NARDOSMIA palmata.
ASTER radula
" spectabilis.
" concolor.
" lævis.
" undulatus.
" cordifolius.
" sagittifolius.
" ericoides.
" miser.
" carneus.
" novi-belgii.
" *nemoralis.*
DIPLOPAPPUS umbellatus.
SOLIDAGO *puberula.*
" *speciosa.*
" thyrsoidea.
" virga-aurea.
" elliptica.
" rigida.
" sempervirens.
" arguta.
" muhlenbergii.
" linoides.
" ulmifolia.

BACCHARIS halimifolia.
SILPHIUM trifoliatum.
BIDENS cernua.
MATRICARIA *parthenium.*
ARTEMISIA canadensis.
" vulgaris.
" *absinthium.*
" *abrotanum.*
CACALIA suaveolens.
CNICUS benedictus.
ONOPORDON *acanthium.*
SILYBUM *marianum.*
HIERACIUM scabrum.
" gronovii.
NABALUS nanus.
" boottii.
" *racemosus*
SONCHUS oleraceus.
" asper.
" arvensis.
AZALEA nudiflora.*
" viscosa.*
" hispida.
RHODORA canadensis.
KALMIA latifolia.*
VACCINIUM (all the species in fruit).
GAYLUSSACCIA dumosa.
" frondosa.*
" resinosa.*
PYROLA rotundifolia.*
" *asarifolia.*
" uliginosa.
" elliptica.*
" chlorantha.*
" *minor.*
MONESES uniflora.*
ILEX monticola.
" glaber.*
DIOSPYROS virginiana.*
PRIMULA mistassinica.*
" *farinosa.*
LYSIMACHIA lanceolata:
v. angustifolia.
HOTTONIA inflata.
SAMOLUS valerandi.
PLANTAGO cordata.
PINGUICULA vulgaris.
UTRICULARIA inflata.
" purpurea.
" intermedia.
" minor.
" *clandestina.*
" *gibba.*
CONOPHOLIS americana.
CATALPA bignonioides.

MARTYNIA proboscidea.
VERBASCUM (the hybrids).
LINARIA vulgaris, *v.* peloria.
" elatine.
" *genistifolia.*
LIMOSELLA aquatica.
VERONICA officinalis.
" peregrina.
" agrestis.
GERARDIA pedicularis.
" flava.
" quercifolia.
VERBENA spuria, seu officinalis.
MENTHA piperita.
LYCOPUS europæus.
MONARDA punctata.
THYMUS *serpyllum.*
SCUTELLARIA nervosa.
DRACOCEPHALUM parviflorum.
STACHYS palustris, *v.* cordata.
PHLOMIS tuberosa.
PULMONARIA virginica.*
LITHOSPERMUM officinale.
" *angustifolium.*
" canescens.*
MYOSOTIS arvensis.
" *verna.*
HYDROPHYLLUM virginicum.*
" canadense.
" appendiculatum.
POLEMONIUM cœruleum.
CONVOLVULUS arvensis.*
IPOMŒA pandurata.*
HYOSCYAMUS niger.*
PHYSALIS viscosa.
" *pubescens.*
" *angulata.*
SOLANUM carolinense.
GENTIANA saponaria, *v.* linearis.
" andrewsii, *v. alba.*
" ochroleuca.
" *alba.*
HALENIA deflexa.
ERYTHRÆA centaurium.
" ramosissima.
SABBATIA chloroides.*
MENYANTHES trifoliata.*
LIMNANTHEMUM lacunosum.*
ASCLEPIAS phytolaccoides.*
" obtusifolia.*
" variegata.*
" quadrifolia.*
" tuberosa.*
" verticillata.*
PERIPLOCA *græca.*

FRAXINUS americana.
" pubescens.
" sambucifolia.*
" *viridis.*
ARISTOLOCHIA serpentaria.*
ASARUM canadense.*
CORISPERMUM *hyssopifolium.*
CHENOPODIUM *urbicum.*
" *murale.*
" *glaucum.*
" ambrosioides.
ROUBIEVA *multifida.*
BLITUM maritimum.
.. capitatum.
" bonus-henricus.
OBIONE arenaria.
CHENOPODINA maritima.
AMARANTUS hybridus.
" polygonoides.
EUXOLUS pumilus.
MONTELIA tamariscina.
ACNIDA cannabina.
POLYGONUM coccineum (Bigel.).
" *careyi.*
acre.
nodosum, v. incarnatum.
RUMEX *conglomeratus.*
altissimus.
maritimus.
" *hydrolapathum.*
COMANDRA umbellata.*
DIRCA palustris.
SHEPHERDIA canadensis.†
CALLITRICHE verna.
" autumnalis.
JUGLANS cinerea.†
" nigra.
CARYA alba.
" tomentosa.†
glabra.
microcarpa.
amara.*
OSTRYA virginica.†
CARPINUS americana.†
CORYLUS americana.†
" rostrata.†
QUERCUS tinctoria.*
rubra.*
obtusiloba.*
macrocarpa.*
olivæformis.
alba.*
bicolor.
montana.*
" prinoides.*
CASTANEA vesca.*
CASTANEA pumila.
BETULA populifolia.†
" papyracea.
" excelsa.†
" nigra.
" nana.
ALNUS serrulata.†
" incana.†
" viridis.†
SALIX *eriocephala.*
" *sericea.*
" petiolaris.†
" *purpurea.*
" *longifolia.*
" *alba.*
" *phylicifolia.*
" cordata, v. *myricoides.*
POPULUS heterophylla.†
" nigra.
MORUS alba.
URTICA dioica.
" *gracilis.*
HUMULUS lupulus.
PINUS resinosa.
" rigida.
" strobus.
" mitis.
ABIES balsamea.
" nigra.
" alba.
CUPRESSUS thuyoides.†
THUJA occidentalis.†
ARISÆMA dracontium.
PELTANDRA virginica.
CALLA palustris.*
SYMPLOCARPUS fœtidus.*
ORONTIUM aquaticum.*
LEMNA minor.†*
" trisulca.†*
" gibba.
" polyrrhiza.†*
SPARGANIUM *eurycarpum.*
" *natans.*
" *angustifolium.*
NAIAS flexilis.
ZOSTERA marina.
RUPPIA maritima.
ZANNICHELLIA palustris.
POTAMOGETON heterophyllum.
" hybridum.
" *lucens.*
" perfoliatus.
" *prælongus.*
" compressus.
" pusillus.
" pauciflorus.

POTAMOGETON pauciflorus, *v. niagarensis.*
" *tuckermanni.*
" pectinatus.
" *robbinsii.*
" *crispus.*
SAGITTARIA variabilis, all the var.
" heterophylla (all varieties).
" *simplicifolia.*
" *calycina.*
LIMNOBIUM spongia.
VALLISNERIA spiralis.
CORALLORRHIZA *macræi.*
PLATANTHERA fimbriata.
POGONIA verticillata.
CALOPOGON pulchellus.§
SPIRANTHES graminea?
" cernua.
CALYPSO borealis.
SMILACINA stellata.*
" racemosa.*
SMILAX rotundifolia.*
" hispida.*
" glauca.
" herbacea.
LILIUM philadelphicum.*
" canadense.*
" superbum.*
ERYTHRONIUM americanum.*§
" albidum.*
ORNITHOGALUM umbellatum.§
ALLIUM vineale.§
" tricoccum.
MELANTHIUM virginicum.
UVULARIA grandiflora.
" sessilifolia.*
STREPTOPUS amplexifolius.
" roseus.*
JUNCUS nodosus.
" acuminatus.
XYRIS *bulbosa.*
FUIRENA squarrosa.
ELEOCHARIS *compressa.*
" *melanocarpa.*
SCIRPUS *pauciflorus.*
" *olneyi.*
" *fluviatilis.*
RHYNCHOSPORA fusca.*
CAREX *scirpoidea.*
" steudelii.
" vulpina.
" *sychnocephala.*
" canescens, *v. vitilis.*
" *adusta.*
" *festucacea.*
" *tenera.*
" torta.
CAREX *aperta.*
" strictior.
" *irrigua.*
" *panicea.*
" *retrocurva.*
" *varia.*
" *richardsonii.*
" *polymorpha.*
" *mirata.*
" *grayii.*
" *rostrata.*
" *lenticularis.*
" trichocarpa.
" torreyi.
" *platyphylla.*
" *blanda* (Dew.).
ALOPECURUS pratensis.
" geniculatus.
" *aristulatus.*
SETARIA italica.
ARISTIDA *purpurascens.*
" *tuberculosa.*
MUHLENBERGIA sobolifera.
" *capillaris.*
SPOROBOLUS heterolepis.
AGROSTIS vulgaris.
" alba.
POA brevifolia.
TRICUSPIS *purpurea.*
GLYCERIA *obtusa.*
" *maritima.*
" *distans.*
BROMUS *racemosus.*
" *mollis.*
FESTUCA *ovina.*
LOLIUM *temulentum.*
TRITICUM repens.
" caninum.
HORDEUM jubatum.
ANDROPOGON furcatus.
TRIPSACUM dactyloides.
EQUISETUM arvense.
" *eburneum.*
" sylvaticum.
" limosum.
" *palustre.*
" *hyemale.*
CHEILANTHES lanuginosa.
ASPIDIUM spinulosum, *v.* boottii.
" aculeatum.
WOODSIA ilvensis.
" *glabella.*
OPHIOGLOSSUM vulgatum.
BOTRYCHIUM virginicum.
" lunarioides.
" simplex.
SALVINIA natans.

(B.)

DONATIONS TO THE STATE CABINET DURING 1863.

From *L. C. Clow*, St. Louis, Mo.:

One specimen of Silicified wood from the Cascades of the Missouri.

From *George Van Campen*, Cattaraugus Co.:

One specimen of Conglomerate.
One mass of fossils from Chemung Group.

From *Noah S. Dean*, Albany, N. Y.:

One vertebra of the Phocaena orca (Grampus), obtained at Fire Island, N. Y.

From *C. W. Englehart*, Sackett's Harbor, N. Y.:

Tridaena gigas; one valve, from the East Indies; weight 175 pounds.

From *Hon. Robert H. Pruyn*, Resident Minister of the United States in Japan:

Bird, two species, undetermined, from Japan.
Reptilia, ophidia, one species, undetermined, from Japan.

Lacertae, three species,	do	do
Amphibia ranidae, four species	do	do
Fishes, thirteen species,	do	do
Insects, two species,	do	do
Crustacea, six species	do	do
Mollusca, one species	do	do

From the *Smithsonian Institution*:

Mactra (Lyrodesma) Ponderosa-myocene, Fort Washington, Md.
Escara digitata, Cretaceous, Backwoodstown, N. J.

Spirula rotula,	do	do	do
Escara digitata, var.	do	do	do
Escagyra costata,	do	do	do

Gryphia vesicularis, Cretaceons, Marlboro, N. J.
Terebratula plicata, do 1st bed of green sand, N. J.
Belemnitella mucrinata, do Marlboro, do
Terebratula Harlani, Cretaceous, near Egypt, 2d green sand, N. J.
Escagyra lateralis, do do do do
Cucullia autrosa, do do do do
Gryphia vesicularis, do Freehold, do
Teredo libiulis, Cretaceous, upper green sand, Backwoodstown, N. J.
Belemnitella mucrinata, Cretaceous, upper green sand, near Armstrong, N. J.
Cucullia gigantæ, Tertiary eocene, Fort Washington, Md.
Schapharia idonea, do miocene, Freehold, N. J.
Chione alveolata, do do St. Mary's River, Md.
Fusus paralis, do do do
Crucibellum costata, do do do
Turitella variabilis, do do do
Terebra simplex, do do do
Dentalium attenuata, do do do
Busycon cornutum, do do do
Merinaria tetrica, do do do
Pectin Madisoni do do East Virginia.
do do do do St. Mary's River, Md.
Turitella mortoni, do do Aquia Creek.

From *Henry Phillips, Jr.*, Philadelphia:

One specimen of Hæmatite.

From *Rev. James Riley*, Montrose, Pa.:

Cyclopteris Jacksonii, two specimens.
Rhuchopteris punctata.
Rhuchopteris cyclopteroides, two specimens.
Four plaster casts of undetermined fossils.
Verbascum lychnitis —(white floweret).

From *Henry A. Homes*, Albany.

Limestone from Jerusalem, of which the city is built.
Verd antique from an ancient temple at Constantinople.
Chalcedony, Greenstone and Trachite, from the shores of the Bosphorus.
Lignite, from the shore of the Black Sea, three miles west of the mouth of the Bosphorus.

(C.)

CATALOGUE OF ADDITIONS MADE BY THE CURATOR

DURING 1863.

Dr. S. B. Woolworth,

Secretary of the Regents :

Sir—Within the year I have collected and placed in the State Cabinet, the following fossils:

From the Oneida Conglomerate, New Hartford — Orthophycus Harlani (Fucoids Harlani of Vanuxem).

This fossil has been regarded as being found only in the Medina sandstone. Mr. Vanuxem in his description says: "In this rock we find the Fucoids Harlani, and in no other of the whole of the New York system has it been seen; it appears therefore to be one of those fossils which are limited to the rock, and which affords us a positive character whereby to recognize the rock, or its position in the great series."

The fossil is found within two feet of the base of the Conglomerate, which rests on the slate of the Hudson River group. The thickness of the Conglomerate at New Hartford is near twenty feet, and it must be the sole representative of the grey sandstone of Oswego and the Medina sandstone, which in the western part of the State is at least five hundred feet thick.

Mr. Vanuxem says: "The Conglomerate *must* rest on the red sandstone in Cayuga County, the two rocks being near each other, and no intermediate there existing, but *the space* between is *covered* so as to *conceal* the contact. Such also would be its position in Oswego, were the whole of the alluvial of the north border of the lake removed, and the Conglomerate left in its original position."

By this it seems that he did not see the junction of the two rocks, and hence the error.

The Fucoid in the Medina sandstone is only found about twenty feet below the surface of the rock, which is very near the same position it is in the Conglomerate.

From the Water lime group, Litchfield, Herkimer County, four specimens of Eurypteues.

From the lower Pentamerus limestone, Litchfield, a splendid specimen of Mariacrinus pachydactylus.

Three Platycrinus parvus.

A Homocrinus scoparius, showing the body, arms and proboscis very fine.

Crinoid (new ?)

Arms of undescribed Crinoideans.

Respectfully submitted,

E. JEWETT,

Curator.

December 31, 1863.

(D.)

ADDITIONS TO THE CABINET DURING 1863,

ACQUIRED BY PURCHASE.

Trichecus rosmarus. Walrus. A head, from Hudson's Bay.

Physeter macrocephalus. Sperm Whale. The lower jaw-bones; taken from a whale captured by Capt. Clothier Peirce of the Barque Marion, of New Bedford, near Chatham Island, South Pacific Ocean. The whale had stove the Captain's boat, who shortly after gave him his death wound ; it yielded 80 barrels of oil, which sold for $4,400. The jaw weighs 505 pounds.

(E.)

PRELIMINARY LIST OF THE PLANTS OF BUFFALO AND ITS VICINITY:

BY GEORGE W. CLINTON,

President of the Buffalo Society of Natural Sciences.

NOTE OF ABBREVIATIONS.

f. w. means fieldweed.
g. w. .. garden-weed.
c. s. .. culture scape.
g. s. .. garden scape.
acc. .. accidental. It implies that the seed has been brought by cattle train, etc., and spontaneously produced plants, but that it is doubtful whether it can propagate itself here.

RANUNCULACEÆ.

CLEMATIS virginiana, *L.*
ANEMONE cylindrica, *Gray.*
virginiana, *L.*
pennsylvanica, *L.*
nemorosa, *L.*
HEPATICA triloba, *Chaix.*
acutiloba, *DC.*
THALICTRUM anemonoides, *Mx.*
dioicum, *L.* [Portage.
cornuti, *L.*
RANUNCULUS aquatilis, *L.*: *v.* divaricatus.
purshii, *Richards.*
cymbalaria, *Pursh.* Salina.
abortivus, *L.*
sceleratus, *L.*
recurvatus, *Poir.*
pennsylvanicus, *L.*
fascicularis, *Muhl.*
repens, *L.*
acris, *L.*
CALTHA palustris, *L.*
COPTIS trifolia, *Salisb.*
AQUILEGIA canadensis, *L.*
DELPHINIUM consolida, *L.*
ACTÆA spicata, *v.* rubra, *Mx.*
" *v.* alba, *Mx.*
CIMICIFUGA racemosa, *L.*
NIGELLA damascena, *L.* g. w.

MAGNOLIACEÆ.

MAGNOLIA acuminata, *L.*
LIRIODENDRON tulipifera, *L.*

MENISPERMACEÆ.

MENISPERMUM canadense, *L.*

BERBERIDACEÆ.

CAULOPHYLLUM thalictroides, *Mx.*
PODOPHYLLUM peltatum, *L.*

NYMPHÆACEÆ.

NYMPHÆA odorata, *Ait.*
NUPHAR advena, *Ait.*

SARRACENIACEÆ.

SARRACENIA purpurea, *L.* Chautauqua county.

PAPAVERACEÆ.

PAPAVER somniferum, *L.* g. w.
CHELIDONIUM majus, *L.*
SANGUINARIA canadensis, *L.*

FUMARIACEÆ.

DICENTRA cucullaria, *DC.*
canadensis, *DC.*
CORYDALIS glauca, *Pursh.* Alexandria bay.
FUMARIA officinalis, *L.*

CRUCIFERÆ.

NASTURTIUM officinale, *R.Br.* Niagara falls.
palustre, *DC.*
lacustre, *Gray.*
armoracia, *Fries.* c. s.
DENTARIA diphylla, *L.*
laciniata, *Muhl.*
CARDAMINE rhomboidea, *DC.*
" *v.* purpurea, *Torr.*
pratensis, *L.*
hirsuta, *L.*
ARABIS lyrata, *L.*
hirsuta, *Scop.* Niagara falls.
lævigata, *DC.*
canadensis, *L.*
TURRITIS glabra, *L.*
BARBAREA vulgaris, *R.Br.*
ERYSIMUM cheiranthoides, *L.*
SISYMBRIUM officinale, *Scop.*
SINAPIS arvensis, *L.*
nigra, *L.*
BRASSICA campestris, *L.* c. s.?
CAMELINA sativa, *Crantz.*
ALYSSUM calycinum. Brock's monument.
LEPIDIUM virginicum, *L.*
CAPSELLA bursa-pastoris, *Mœnch.*
CAKILE americana, *Nutt.*
RAPHANUS sativus, *L.* f. w.
HESPERIS matronalis, *L.* g. s.

CAPPARIDACEÆ.

POLANISIA graveolens, *Raf.*

RESEDACEÆ.

RESEDA odorata, *L.* g. s.
alba, *L.* g. s.

VIOLACEÆ.

VIOLA rotundifolia, *Mx.* Chaut. co.
blanda, *Willd*
selkirkii, *Goldie.* Chaut. co.
cucullata, *Ait.*
palmata, *L.*
sagittata, *Ait.*
rostrata, *Pursh.*
muhlenbergii, *Torr.*
canadensis, *L.*
striata, *Ait.* Lagrange.
pubescens, *Ait.*
tricolor. g. w.
" *v.* arvensi, *DC.* nat.

CISTACEÆ.

HELIANTHEMUM canadense, *Mx.*
LECHEA major, *Mx.*
minor, *Lam.*

DROSERACEÆ.

DROSERA rotundifolia, *L.* Chaut.co.

PARNASSIACEÆ.

PARNASSIA caroliniana, *Mx.*

HYPERICACEÆ.

HYPERICUM pyramidatum, *Ait.*
kalmianum, *L.* Goat island.
perforatum, *L.*
corymbosum, *L.*
mutilum, *L.*
ELODEA virginica, *Nutt.*

CARYOPHYLLACEÆ.

SAPONARIA officinalis, *L.*
VACCARIA vulgaris, *Host.* acc.
SILENE inflata, *Smith.* nat.
armeria, *L.* g. w.
antirrhina, *L.*
noctiflora, *L.*
AGROSTEMMA githago, *L.*
ARENARIA serpyllifolia, *L.*
MŒHRINGIA lateriflora, *L.*
STELLARIA media, *Smith.*
longifolia, *Muhl.*
CERASTIUM vulgatum, *L.*
viscosum, *L.*
nutans, *Raf.*
arvense, *L.*
SPERGULA arvensis, *L.*
MOLLUGO verticillata, *L.*

PORTULACACEÆ.

PORTULACA oleracea, *L.*
CLAYTONIA virginica, *L.*
caroliniana, *Mx.*

MALVACEÆ.

ALTHÆA rosea, *L.* g. s.
MALVA rotundifolia, *L.*
sylvestris, *L.* g. s.
ABUTILON avicennæ, *Gœrt.* Lewiston.
HIBISCUS moscheutos, *L.*
trionum, *L* g. s.

TILIACEÆ.

TILIA americana, *L.*

LINACEÆ.

LINUM virginianum, *L.*
usitatissimum, *L.* c. s.

OXALIDACEÆ.

OXALIS acetosella, *L.* Chaut. co.
stricta, *L.*

GERANIACEÆ.

GERANIUM maculatum, *L.*
robertianum, *L.*

BALSAMINACEÆ.

IMPATIENS pallida, *Nutt.*
fulva, *Nutt.*

LIMNANTHACEÆ.

FLŒRKEA proserpinacoides, *Willd.*

RUTACEÆ.

ZANTHOXYLUM americanum, *Mill.*
PTELEA trifoliata, *L.*

ANACARDIACEÆ.

RHUS typhina, *L.*
glabra, *L.*
venenata, *L.*
toxicodendron, *L.*
radicans, *L.*
aromatica, *Ait.* Niag. falls.

VITACEÆ.

VITIS labrusca, *L.*
æstivalis, *L.*
cordifolia, *Mx.*
AMPELOPSIS quinquefolia, *Mx.*

RHAMNACEÆ.

RHAMNUS catharticus, *L.* Hedges.
alnifolius, *L'Her.*
CEANOTHUS americanus, *L.*

CELASTRACEÆ.

CELASTRUS scandens, *L.*
EUONYMUS atropurpureus, *Jacq.*
obovatus, *Nutt.*

SAPINDACEÆ.

STAPHYLEA trifolia, *L.*
ACER pennsylvanicum, *L.*
spicatum, *Lam.*
saccharinum, *Wang.*
nigrum, *Mx.*
dasycarpum, *Ehr.*
rubrum, *L.*

POLYGALACEÆ.

POLYGALA verticillata, *L.*
senega, *L.*
paucifolia, *Willd.*

LEGUMINOSÆ.

LUPINUS perennis, *L.*
TRIFOLIUM arvense, *L.*
pratense, *L.*
repens, *L.*
MELILOTUS officinalis, *Willd.*
alba, *Lam.*
MEDICAGO lupulina, *L.*
sativa, *L.* c. s.
ROBINIA pseudacacia, *L.* cult.
viscosa, *Vent.* cult.
GLYCYRHIZA lepidota, *Nutt.*
ASTRAGALUS canadensis, *L.*
cooperi, *Gray.*
DESMODIUM nudiflorum, *DC.*
acuminatum, *DC.*
rotundifolium, *DC.*
cuspidatum, *T. & G.*
dillenii, *Darl.*
paniculatum, *DC.*
canadense, *DC.*
rigidum, *DC.*
marilandicum, *Boott.*
LESPEDEZA violacea, *Pers.*
hirta, *Ell.*
capitata, *Mx.*
VICIA sativa, *L.*
caroliniana, *Walt.*
americana, *Muhl.*
LATHYRUS maritimus, *Bigelow.*
ochroleucus, *Hook.*
palustris, *L.*
myrtifolius, *Muhl.*
PISUM sativum, *L.* f. w.
APIOS tuberosa, *Mœnch.*
AMPHICARPÆA monoica, *Nutt.*

ROSACEÆ.

PRUNUS americana, *Marsh.*
pennsylvanica, *L.*
virginiana, *L.*
serotina, *Ehr.*
SPIRÆA opulifolia, *L.*
salicifolia, *L.*
AGRIMONIA eupatoria, *L.*
GEUM album, *Gmelin.*
virginianum, *L.*
strictum, *Ait.*
rivale, *L.*
WALDSTEINIA fragarioides, *Traut.*
POTENTILLA norvegica, *L.*
canadensis, *L.*
argentea, *L.*
anserina, *L.*
palustris, *Scop.*

FRAGARIA virginiana, *Ehr.*
vesca, *L.*
DALIBARDA repens, *L.*
RUBUS odoratus, *L.*
triflorus, *Rich.*
strigosus, *Mx.*
occidentalis, *L.*
villosus, *Ait.*
" *v.* humifusus.
canadensis, *L.*
hispidus, *L.*
ROSA carolina, *L.*
lucida, *Ehr.*
blanda, *Ait.*
rubiginosa, *L.*
spinosissima, *L.* g. s.
CRATÆGUS oxycantha, *L.* Hedge.
coccinea, *L.*
tomentosa, *L.*
crus-galli, *L.*
PYRUS communis, *L.* Grand island.
malus, *L.* Grand island.
coronaria, *L.*
arbutifolia, *L.*
americana, *DC.* Chaut. co.
AMELANCHIER canadensis, *T. & G.*

LYTHRACEÆ.

NESÆA verticillata, *Kunth.*

ONAGRACEÆ.

EPILOBIUM angustifolium, *L.*
palustre, *L.: v.* lineare, *Gr.*
coloratum, *Muhl.*
ŒNOTHERA biennis, *L.*
chrysantha, *Mx.*
GAURA biennis, *L.*
LUDWIGIA palustris, *L.*
CIRCÆA lutetiana, *L.*
alpina, *L.*
PROSERPINACA palustris, *L.*
MYRIOPHYLLUM spicatum, *L.*
heterophyllum, *Mx.*
HIPPURIS vulgaris, *L.* Schuyler's lake, Otsego county; Alexandria bay.

GROSSULACEÆ.

RIBES cynosbati, *L.*
hirtellum, *Mx.*
prostratum, *L'Her.* Alex. bay.
floridum, *L.*
rubrum, *L.*

CUCURBITACEÆ.

SICYOS angulatus, *L.* acc.
ECHINOCYSTIS lobata, *T. & G.*

CRASSULACEÆ.

SEDUM telephium, *L.* g. s.
acre, *L.* nat.
PENTHORUM sedoides, *L.*

SAXIFRAGACEÆ.

SAXIFRAGA virginiensis, *Mx.*
pennsylvanica, *L.*
MITELLA diphylla, *L.*
TIARELLA cordifolia, *L.*
CHRYSOSPLENIUM americanum, [*Schwein.*

HAMAMELACEÆ.

HAMAMELIS virginica, *L.*

UMBELLIFERÆ.

HYDROCOTYLE americana, L.
SANICULA canadensis, *L.*
marylandica, *L.*
DAUCUS carota, *L.*
HERACLEUM lanatum, *Mx.*
PASTINACA sativa, *L.*
ARCHANGELICA hirsuta, *T. & G.*
atropurpurea, *Hoff.* [Portage.
THASPIUM barbinode, *Nutt.*
aureum, *Nutt.*
ZIZIA integerrima, *DC.*
CICUTA maculata, *L.*
bulbifera, *L.*
SIUM lineare, *Mx.*
angustifolium, *L.?*
CRYPTOTÆNIA canadensis, *DC.*
OSMORRHIZA longistylis, *DC.*
brevistylis, *DC.*
CONIUM maculatum, *L.*
ERIGENIA bulbosa, *Nutt.*
CARUM carui, *L.* g. s. nat. in Chau.
ANETHUM fœniculum, *L.* g. s.
CORIANDRUM sativum, *L.* g. s.

ARALIACEÆ.

ARALIA racemosa, *L.*
hispida, *Mx.*
nudicaulis, *L.*
PANAX quinquefolium, *L.*
trifolium, *L.*

CORNACEÆ.

CORNUS canadensis, *L.*
florida, *L.*
circinata, *L'Her.*
sericea, *L.*
stolonifera, *Mx.*
paniculata, *L'Her.*
alternifolia, *L.*
NYSSA multiflora, *Wang.*

CAPRIFOLIACEÆ.

SYMPHORICARPUS racemosus, *Mx.*
LONICERA sempervirens, *Ait.*
parviflora, *Lam.*
ciliata, *Muhl.*
DIERVILLA trifida, *Mœnch.*
TRIOSTEUM perfoliatum, *L.*
SAMBUCUS canadensis, *L.*
pubens, *Mx.*
VIBURNUM nudum, *L.*
lentago, *L.*
dentatum, *L.*
pubescens, *Pursh.*
acerifolium, *L.*
opulis, *L.*
lantanoides, *Mx.*

RUBIACEÆ.

GALIUM aparine, *L.*
asprellum, *Mx.*
trifidum, *L.*
tinctorium, *L.*
triflorum, *Mx.*
pilosum, *Ait.*
circæzans, *Mx.*
lanceolatum, *Torr.*
boreale, *L.*
CEPHALANTHUS occidentalis, *L.*
MITCHELLA repens, *L.*
OLDENLANDIA ciliolata, *Torr.*
cœrulea, *Gray.*

VALERIANACEÆ.

VALERIANA officinalis, *L.* g. s.
FEDIA fagopyrum, *T. & G.*

DIPSACEÆ.

DIPSACUS sylvestris, *Mill.*

COMPOSITÆ.

LIATRIS cylindraceæ, *Mx.* Niagara
EUPATOREUM purpureum, *L.* [falls.
perfoliatum, *L.*
ageratoides, *L.*
TUSSILAGO farfara, *L.*
ASTER corymbosus, *Ait.*
macrophyllus, *L.*
lævis, *L.*
" *v.* cyaneus.
undulatus, *L.* Portage.
cordifolius, *L.*
sagittifolius, *Willd.*
ericoides, *L.*
" *v.* villosus.
multiflorus, *Ait.*
tradescanti, *L.*
miser, *L,*
" *v.* hirsuticaulis.
" *v.* diffusus.
simplex, *Willd.*
tenuifolius, *L.*: *v.* bellidiflorus.
longifolius, *Lam.*
puniceus, *L.*
" *v.* vimineus.
prenanthoides, *Muhl.*
novæ-angliæ, *L.*
ptarmicoides, *T. & G.* Niag.
ERIGERON canadense, *L.* [falls.
bellidifolium, *Muhl.*
philadelphicum, *L.*
annuum, *Pers.*
strigosum, *Muhl.*
DIPLOPAPPUS umbellatus, *T. & G.*
SOLIDAGO squarrosa, *Muhl.* Ro-
bicolor, *L.* [chester.
latifolia, *L.*
cæsia, *L.*
rigida, *L.*
arguta, *Ait.*
" *v.* juncea.
muhlenbergii, *T. & G.*
altissima, *L.*
nemoralis, *Ait.*
canadensis, *L.*
" *v.* procera.
serotina, *Ait.*
gigantea, *Ait.*
lanceolata, *L.*
INULA helenium, *L.*
POLYMNIA canadensis, *L.*
MATRICARIA parthenium, *L.* g. s.
balsamita, *Willd.* g. s.
AMBROSIA trifida, *L.*
artemisiæfolia, *L.*
XANTHIUM strumarium, *L.*
spinosum, *L.* acc.
HELIOPSIS lævis, *Pers.*
RUDBECKIA laciniata, *L.*
hirta, *L.*

HELIANTHUS annuus, *L.* g. s.
strumosus, *L.*
divaricatus, *L.*
decapetalus, *L.*
tuberosus, *L.* g. s.
COREOPSIS tinctoria, *Nutt.*
trichosperma, *Mx.*
BIDENS frondosa, *L.*
connata, *Muhl.*
cernua, *L.*
chrysanthemoides, *Mx.*
beckii, *Torr.*
bipinnata, *L.*
DYSODIA chrysanthemoides, *Lag.*
HELENIUM autumnale, *L.* [acc.
MARUTA cotula, *DC.*
ACHILLEA millefolium, *L.*
LEUCANTHEMUM vulgare, *Lam.*
TANACETUM vulgare, *L.*
ARTEMISIA canadensis, *Mx.*
biennis, *Willd.*
abrotanum, *L.* g. s.
GNAPHALIUM decurrens, *Ives.*
uliginosum, *L.*
ANTENNARIA margaritacea, *R.Br.*
plantaginifolia, *Hook.*
ERECHTHITES vulgaris, *L.*
SENECIO vulgaris, *L.*
aureus, *L.*
" *v.* balsamitæ.
CIRSIUM lanceolatum, *Scop.*
discolor, *Spreng.*
altissimum, *Spreng.?*
muticum, *Mx.?*
pumilum, *Spreng.*
arvense, *Scop.*
SILYBUM marianum, *Gært.* g. s.
ONOPORDON acanthium, *L.* James-
LAPPA major, *Gært.* [town. nat.
CICHORIUM intybus, *L.*
HIERACIUM canadense, *Mx.*
scabrum, *Mx.*
gronovii, *L.*
venosum, *L.*
paniculatum, *L.*
NABALUS albus, *Hook.*
altissimus, *Hook.*
TARAXACUM dens-leonis, *Desf.*
LACTUCA elongata, *Muhl.*
MULGEDIUM leucophæum, *DC.*
SONCHUS oleraceus, *L.* f. w.
asper, *Vill.* f. w.

LOBELIACEÆ.

LOBELIA cardinalis, *L.*
syphilitica, *L.*
inflata, *L.*
kalmii, *L.*

CAMPANULACEÆ.

CAMPANULA rotundifolia, *L.*
aparinoides, *Pursh.*
americana, *L.*
SPECULARIA perfoliata, *A.DC.*

ERICACEÆ.

GAYLUSSACIA resinosa, *T. & G.*
VACCINIUM oxycoccus, *L.* Chaut.
macrocarpon, *Ait.* Chaut.
stamineum, *L.*
pennsylvanicum, *L.*
corymbosum, *L.* [Niag. f.
ARCTOSTAPHYLOS uva-ursi, *Spreng.*
EPIGÆA repens, *L.* Portage.
GAULTHERIA procumbens, *L.*
AZALEA nudiflora, *L.* Portage.
PYROLA rotundifolia, *L.* Niag. f.
elliptica, *Nutt.*
chlorantha, *Swartz.* Niag. f.
secunda, *L.*
MONESES uniflora, *Gray.*
CHIMAPHILA umbellata, *Nutt.*
maculata, *Pursh.*
PTEROSPORA andromedea, *Nutt.*
MONOTROPA uniflora, *L.* [Niag. f.;
hypopitys, *L.* [Portage.

AQUIFOLIACEÆ.

ILEX verticillata, *Gray.*
NEMOPANTHES canadensis, *DC.*

PLANTAGINACEÆ.

PLANTAGO major, *L.*
rugelii, *Dec.?*
lanceolata, *L.*

PRIMULACEÆ.

TRIENTALIS americana, *Pursh.*
LYSIMACHIA stricta, *Ait.*
quadrifolia, *L.* Portage.
ciliata, *L.*
longifolia, *Pursh.*
NAUMBURGIA thyrsiflora, *Reich.*
ANAGALLIS arvensis, *L.* g. w.
SAMOLUS valerandi, *L.*

LENTIBULACEÆ.

UTRICULARIA vulgaris, *L.*

BIGNONIACEÆ.

CATALPA bignoniodes, *Walt.* cult.
MARTYNIA proboscidea, *Glox.* g. s.

OROBANCHACEÆ.

EPIPHEGUS virginiana, *Bart.*
CONOPHOLIS americana, *Wallr.*
APHYLLON uniflorum, *T. & G.*

SCROPHULARIACEÆ.

VERBASCUM thapsus, *L.*
blattaria, *L.*
LINARIA vulgaris, *Mill.*
SCROPHULARIA nodosa, *L.*
CHELONE glabra, *L.*
PENTSTEMON pubescens, *Solander.*
MIMULUS ringens, *L.*
alatus, *Ait.*
GRATIOLA virginiana, *L.*
ILYSANTHES gratioloides, *Benth.*
VERONICA virginica, *L.* Portage.
americana, *Schwein.*
scutellata, *L.*
officinalis, *L.*
serpyllifolia, *L.*
peregrina, *L.*
arvensis, *L.*
GERARDIA purpurea, *L.*
tenuifolia, *Vahl.*
flava, *L.*
quercifolia, *Pursh.*
pedicularia, *L.* Rochester.
CASTILLEJA coccinea, *Spreng.*
PEDICULARIS canadensis, *L.*
lanceolata, *Mx.*
MELAMPYRUM americanum, *Mx.*

ACANTHACEÆ.

DIANTHERA americana, *L.*

VERBENACEÆ.

VERBENA hastata, *L.*
urticifolia, *L.*
PHRYMA leptostachya, *L.*

LABIATÆ.

TEUCRIUM canadense, *L.*
MENTHA viridis, *L.*
piperita, *L.*
canadensis, *L.*
LYCOPUS virginicus, *L.*
europæus, *L.*
PYCNANTHEMUM incanum, *Mx.*
lanceolatum, *Pursh.* [Port.
CALAMINTHA glabella, *Benth.:*
v. nuttallii, *Gray.*
clinopodium, *Benth.*
MELISSA officinalis, *L.* g. s.
HEDEOMA pulegioides, *Pers.*
COLLINSONIA canadensis, *L.*
MONARDA didyma, *L.*
fistulosa, *L.* [field, Otsego co.
BLEPHILIA hirsuta, *Benth.* Rich-
LOPHANTUS nepetoides, *Benth.*
scrophulariæfolius, *Benth.*
NEPETA cataria, *L.*
glechoma, *Benth.*
DRACOCEPHALUM parviflorum, *Nutt.*
PHYSOSTEGIA virginiana, *Benth.*
BRUNELLA vulgaris, *L.*
SCUTELLARIA parvula, *Mx.*
galericulata, *L.*
lateriflora, *L.*
MARRUBIUM vulgare, *L.*
GALEOPSIS tetrahit, *L.*
STACHYS palustris, *L.: v.* aspera.
LEONURUS cardiaca, *L.*
LAMIUM amplexicaule, *L.*

BORAGINACEÆ.

ECHIUM vulgare, *L.* Niag. falls.
SYMPHITUM officinale, *L.*
ONOSMODIUM carolinianum, *DC.*
LITHOSPERMUM arvense, *L.*
officinale, *L.* Niag. falls.
latifolium, *Mx.*
hirtum, *Lehm.*
MERTENSIA virginica, *DC.*
MYOSOTIS palustris, *With.*
verna, *Nutt.*
ECHINOSPERMUM lappula, *Lehm.*
CYNOGLOSSUM officinale, *L.*
virginicum, *L.* Salamanca.
morrisoni, *DC.*

HYDROPHYLLACEÆ.

HYDROPHYLLUM virginicum, *L.*
canadense, *L.*

POLEMONIACEÆ.

POLEMONIUM reptans, *L.*
PHLOX paniculata, *L.* Richfield,
divaricata, *L.* [Otsego co.

CONVOLVULACEÆ.

IPOMŒA purpurea, *Lam.* g. s.
pandurata, *Meyer.*
CONVOLVULUS arvensis, *L.*

CALYSTEGIA sepium, *R.Br.*
spithamæa, *Pursh.* Rare.
CUSCUTA epilinum, *Weihe.*
gronovii, *Willd.*

SOLANACEÆ.

SOLANUM dulcamara, *L.*
nigrum, *L.*
carolinense, *L.* acc. [g. s.
LYCOPERSICUM esculentum, *Mill.*
PHYSALIS philadelphica, *Lam.* acc.
viscosa, *L.*
NICANDRA physaloides, *Gært.* g. w.
HYOSCYAMUS niger, *L.* nat.
DATURA stramonium, *L.*

GENTIANACEÆ.

FRASERA carolinensis, *Walt.*
GENTIANA quinqueflora, *Lam.*
crinita, *Frœl.*
detonsa, *Fries.*
andrewsii, *Griseb.*
" *v.* albiflora.
MENYANTHES trifoliata, *L.* Chaut.

APOCYNACEÆ.

APOCYNUM androsæmifolium, *L.*
cannabinum, *L.*

ASCLEPIADACEÆ.

ASCLEPIAS cornuti, *Dec.*
phytolaccoides, *Pursh.*
quadrifolia, *Jacq.* Niag. f.
incarnata, *L.*
tuberosa, *L.*
verticillata, *L.* Niag. f.

OLEACEÆ.

LIGUSTRUM vulgare, *L.* Hedges.
FRAXINUS americana, *L.*
sambucifolia, *Lam.*

ARISTOLOCHIACEÆ.

ASARUM canadense, *L.*

PHYTOLACCACEÆ.

PHYTOLACCA decandra, *L.*

CHENOPODIACEÆ.

CORISPERMUM hyssopifolium, *L.*
CHENOPODIUM hybridum, *L.*
urbicum, *L.*: *v.* rhombifolium.
album, *L.*
glaucum, *L.* Salina; Albany.
botrys, *L.*
ambrosioides, *L.*
BLITUM capitatum, *L.*
ATRIPLEX hastata, *L.* Salina.
SALICORNIA herbacea, *L.* Salina.

AMARANTACEÆ.

AMARANTUS retroflexus, *L.*
albus, *L.*
polygonoides, *L.* Albany.

POLYGONACEÆ.

POLYGONUM orientale, *L.* g. s.
amphibium, *L.*
nodosum, *Pers.*: *v.* incarna-
pennsylvanicum, *L.* [tum.
persicaria, *L.*
hydropiper, *L.*
acre, *H. B. K.*
hydropiperoides, *Mx.*
aviculare, *L.*
erectum, *L.*
virginianum, *L.*
arifolium, *L.*
sagittatum, *L.*
convolvulus, *L.*
dumetorum, *L.*
FAGOPYRUM esculentum, *Mœnch.*
RUMEX verticillatus, *L.*
hydrolapathum, *Huds.*: *v.*
obtusifolius, *L.* [americanum.
crispus, *L.*
sanguineus, *L.*
acetosella, *L.*

LAURACEÆ.

SASSAFRAS officinale, *Nees.*
BENZOIN odoriferum, *Nees.*

THYMELEACEÆ.

DIRCA palustris, *L.*

ELÆAGNACEÆ.

SHEPHERDIA canadensis, *Nutt.*

SANTALACEÆ.

COMANDRA umbellata, *Nutt.*

SAURURACEÆ.

SAURURUS cernuus, *L.*

CALLITRICHACEÆ.

CALLITRICHE verna, *L.*
" *v.* terrestris.
autumnalis, *L.*

EUPHORBIACEÆ.

EUPHORBIA polygonifolia, *L.*
maculata, *L.*
hypericifolia, *L.*
helioscopia, *L.*
platyphylla, *L.*
lathyris, *L.* Silver creek. nat.
ACALYPHA virginica, *L.*

URTICACEÆ.

ULMUS fulvus, *Mx.*
americana, *L.*
racemosa, *Thomas.*
MORUS rubra, *L.* Niag. f.
alba, *L.* cult.
URTICA gracilis, *Ait.*
dioica, *L.*
LAPORTEA canadensis, *Gaud.*
PILEA pumila, *Gray.*
BŒHMERIA cylindrica, *Willd.*
CANNABIS sativa, *L.*
HUMULUS lupulus, *L.*

PLATANACEÆ.

PLATANUS occidentalis, *L.*

JUGLANDACEÆ.

JUGLANS cinerea, *L.*
nigra, *L.*
CARYA alba, *Nutt.*
glabra, *Torr.*
amara, *Nutt.*

CUPULIFERÆ.

QUERCUS macrocarpa, *Mx.*
alba, *L.*
castanea, *Willd.*
FAGUS ferruginea, *Ait.*
CORYLUS americana, *Walt.*
rostrata, *Ait.*
CASTANEA vesca, *L.*
CARPINUS americanus, *Mx.*
OSTREA virginica, *Willd.*

MYRICACEÆ.

MYRICA gale, *L.*
COMPTONIA asplenifolia, *Ait.* Olean.

BETULACEÆ.

BETULA alba, *v.* populifolia, *Spack.*
papyracea, *Ait.* Youngstown.
excelsa, *Ait.*
lenta, *L.*
ALNUS incana, *Willd.*

SALICACEÆ.

SALIX petiolaris, *Smith.*
nigra, *Marsh.*
lucida, *Muhl.*
babylonica, *Tourn.* cult.
alba, *L.* cult.
viminalis, *L.* cult.
POPULUS tremuloides, *Mx*
grandidentata, *Mx.*
monilifera, *Ait.*
balsamifera, *L.*
dilatata, *Ait.* cult.
alba, *L.* cult.

CONIFERÆ.

PINUS resinosa, *L.* Portage.
strobus, *L.*
ABIES canadensis, *Mx.*
LARIX americana, *Mx.*
THUJA occidentalis, *L.*
JUNIPERUS virginiana, *L.*
communis, *L.*
TAXUS canadensis, *Willd.*

ARACEÆ.

ARISÆMA triphyllum, *Torr.*
dracontium, *Schott.*
PELTANDRA virginica, *Raf.* Niag. f.
CALLA palustris, *L.* Chaut. co.
SYMPLOCARPUS fœtidus, *Salisb.*
ACORUS calamus, *L.*

TYPHACEÆ.

TYPHA latifolia, *L.*
angustifolia, *L.*
SPARGANIUM eurycarpum, *Eng.*
ramosum, *Huds.*
simplex, *Huds.*

LEMNACEÆ.

LEMNA trisulca, *L.*
minor, *L.*
polyrhiza, *L.*

NAIADACEÆ.

NAIAS flexilis, *Rostk.*
POTAMOGETON pusillus, *L.*
pauciflorus, *Pursh.*
perfoliatus, *L.*
prælongus, *Wulf.*
lucens, *L.*
natans, *L.*
heterophyllus, *Schreb.*

ALISMACEÆ.

Triglochin palustre, *L.*
Alisma plantago, *L.*
Sagittaria variabilis, *Eng.*
heterophylla, *Pursh.*

HYDROCHARIDACEÆ.

Anacharis canadensis, *Planch.*
Vallisneria spiralis, *L.*

ORCHIDACEÆ.

Orchis spectabilis, *L.*
Platanthera orbiculata, *Lind.*
hookeri, *Lind.*
bracteata, *Torr.*
hyperborea, *Lind.*
dilatata, *Lind.* Chaut. co.
flava, *Gray.*
lacera, *Gray.*
psycodes, *Gray.*
Goodyera repens, *R.Br.*
pubescens, *R.Br.*
Spiranthes gracilis, *Bigel.*
latifolia, *Torr.*
cernua, *Richard.*
Listera cordata, *R.Br.* Angola.
Arethusa bulbosa, *L.* Chaut. co.
Pogonia ophioglossoides, *Nutt.* Chaut. co.
Calopogon pulchellus, *R.Br.* Chau.
Liparis lœselii, *Richard.*
liliifolia, *Richard.*
Corallorhiza innata, *R.Br.*
multiflora, *Nutt.*
Aplectrum hyemale, *Nutt.*
Cypripedium pubescens, *Willd.*
parviflorum, *Salisb.*
spectabile, *Swartz.*
acaule, *Ait.* Eighteen-mile cr.

IRIDACEÆ.

Iris versicolor, *L.*
Sisyrinchium bermudiana, *L.*
" *v.* anceps.
" *v.* mucronatum.

DIOSCORIACEÆ.

Dioscorea villosa, *L.*

SMILACEÆ.

Smilax rotundifolia, *L.*: *v.* quadrangularis.
hispida, *Muhl.*
herbacea, *L.*

Trillium erectum, *L.*
" *v.* album, *Pursh.*
grandiflorum, *Salisb.*
erythrocarpum, *Mx.*
Medeola virginica, *L.*

LILIACEÆ.

Asparagus officinalis, *L.*
Polygonatum biflorum, *Ell.*
giganteum, *Dietr.*
Smilacina racemosa, *Desf.*
stellata, *Desf.*
bifolia, *Desf.*
Clintonia borealis, *Raf.* Rock city.
umbellata, *Torr.*
Hemerocallis fulva, *L.* g. s.
Allium tricoccum, *Ait.*
canadense, *Kahn.*
Lilium philadelphicum, *L.*
canadense, *L.*
Erythronium americanum, *Smith.*
albidum, *Nutt.*

MELANTHACEÆ.

Uvularia grandiflora, *Smith.*
sessilifolia, *L.*
Prosartes lanuginosa, *Don.*
Streptopus roseus, *Mx.*
Veratrum viride, *Ait.*
Chamælirium luteum, *Gray.*

JUNCACEÆ.

Luzula pilosa, *Willd.*
campestris, *DC.*
Juncus effusus, *L.*
balticus, *Willd.*
paradoxus, *E. Meyer.*
debilis, *Gray.*
articulatus, *L.*
nodosus, *L.*
" megacephalus, *Torr.*
tenuis, *Willd.*
bufonius, *L.*

PONTEDERIACEÆ.

Pontedera cordata, *L.*
" *v.* angustifolia.
Schollera graminea, *Willd.*

CYPERACEÆ.

Cyperus diandrus, *v.* castaneus, *Torr.*
strigosus, *L.*
phymatodes, *Muhl.*
schweinitzii, *Torr.*
filiculmis, *Vahl.*

DULICHIUM spathaceum, *Pers.*
ELEOCHARIS quadrangulata, *R.Br.?*
obtusa, *Schultes.*
palustris, *R.Br.*
tenuis, *Schultes.*
acicularis, *R Br.*
SCIRPUS pungens, *Vahl.*
lacustris, *L.*
maritimus, *L.*
fluviatilis, *Gray.*
sylvaticus, *L.: v.* atrovirens.
lineatus, *Mx.*
eriophorum, *Mx.* [Chaut. co.
ERIOPHORUM polystachyon, *L.*
" *v.* angustifolium, Port.
CAREX distycha, *Huds.: v.* sartwel-
cephalophora, *Willd.* [lii, *Dew.*
muhlenbergii, *Schk.*
sparganoides, *Muhl.*
rosea, *Schk.*
retroflexa, *Muhl.*
vulpinoidea, *Mx.*
setacea, *Dew.*
stipata, *Muhl.*
scirpoides, *Schk.*
curta, *Good.*
deweyana, *Schk.*
trisperma, *Dew.*
straminea, *Wahl.*
festucacea, *Schk.*
aurea, *Nutt.*
stricta, *Gooden.*
angustata, *Boott.*
crinita, *Lam.*
polytrichoides, *Muhl.*
pedunculata, *Muhl.*
virescens, *Muhl.*
hirsuta, *Willd.*
gracillima, *Schw.*
pennsylvanica, *Lam.*
varia, *Muhl.*
œderi, *Ehr.*
intumescens, *Rudge.*
lupulina, *Muhl.*
tentaculata, *Muhl.*
plantaginea, *Lam.*
laxiflora, *Lam.*
retrocurva, *Dew.*
granularis, *Muhl.*
debilis, *Mx.*
crawei, *Dew.*
scabrata, *Schw.* Portage.
miliacea, *Muhl.*
hystricina, *Willd.*
comosa, *L.*

CAREX trichocarpa, *Muhl.*
lanuginosa, *Mx.*
filiformis, *Mx.*
lacustris, *Willd.*
utriculata, *Boott.*
ampullacea, *Good.*
tuckermani, *Boott.*

GRAMINEÆ.

LEERSIA oryzoides, *Swartz.*
virginica, *Willd.*
ZIZANIA aquatica, *L.*
ALOPECURUS geniculatus, *L.*
aristulatus, *Mx.*
PHLEUM pratense, *L*
VILFA vaginæflora *Torr.*
SPOROBOLUS cryptandrus, *Gray.*
AGROSTIS scabra, *Willd.*
vulgaris, *With.*
alba, *L.*
CINNA arundinacea, *L.*
pendula, *Trin.*
MUHLENBERGIA glomerata, *Trin.*
mexicana, *Trin.*
sylvatica, *T. & G.*
diffusa, *Schreb.*
BRACHYELYTRUM aristatum, *Beauv.*
CALAMAGROSTIS canadensis, *Beauv.*
ORYZOPSIS melanocarpa, *Muhl.*
asperifolia, *Mx.*
SPARTINA cynosuroides, *Willd.*
TRICUSPIS purpurea, *Gray.*
DACTYLIS glomerata, *L.*
EATONIA obtusata, *Gray.* [jor, *Torr.*
pennsylvanica, *Gray: v.* ma-
GLYCERIA elongata, *Trin.*
nervata, *Trin.*
aquatica, *Smith.*
fluitans, *R.Br.*
POA annua, *L.*
alsodes, *Gray.*
serotina, *Ehrh.*
trivialis, *L.*
pratensis, *L.*
compressa, *L.*
FESTUCA nutans, *Willd.*
BROMUS secalinus, *L.*
racemosus, *L.*
kalmii, *Gray.*
ciliatus, *L.*
" *v.* purgans.
PHRAGMITES communis, *Trin.*
LOLIUM perenne, *L.*
temulentum, *L.*

TRITICUM vulgare, *Villars.* c. s.
repens, *L.*
v. nemorale, *Anderson.*
caninum, *L.*
HORDEUM distichum, *C.* c. s.
vulgare, *L.*
SECALE cereale, *L.* c. s.
ELYMUS virginicus, *L.*
canadensis, *L.*
striatus, *L.*
GYMNOSTICHUM hystrix, *Schreb.*
AIRA flexuosa, *L.*
cæspitosa, *L.* : *v.* aristulata,
DANTHONIA spicata, *Beauv.* [*Torr.*
AVENA sativa, *L.*
PHALARIS arundinacea, *L.*
MILIUM effusum, *L.*
PANICUM glabrum, *Gaudin.*
sanguinale, *L.*
capillare, *L.*
virgatum, *L.*
latifolium, *L.*
dichotomum, *L.*
depauperatum, *Muhl.*
crus-galli, *L.*
xalapense? c. s.
SETARIA glauca, *Beauv.*
viridis, *Beauv.*
italica, *Kunth.* c. s.
ANDROPOGON furcatus, *Muhl.*
scoparius, *Mx.* Niag. f.
SORGHUM nutans, *Gray.*

EQUISETACEÆ.

EQUISETUM arvense, *L.*
sylvaticum, *L.*
limosum, *L.*
palustre, *L.*
hyemale, *L.*
variegatum, *Schl.*

FILICES.

POLYPODIUM vulgare, *L.* Niag. f.
phegopteris, *L.* Rock city.
hexagonopterum, *Mx.*
STRUTHIOPTERIS germanica, *Willd.*
ALLOSORUS atropurpureus, *Gray.*
PTERIS aquilina, *L.* [Niag. f.
ADIANTUM pedatum, *L.*
CAMPTOSORUS rhizophyllus, *Link.*
SCOLOPENDRIUM officinarum, *Swartz.* Chittenango falls.
ASPLENIUM trichomanes, *L.* Niag. f.
ebeneum, *Ait.* Lewiston.
thelypteroides, *Mx.*
filix-fœmina, *R.Br.*
DICKSONIA pilotiuscula, *Willd.*
CYSTOPTERIS bulbifera, *Bernh.*
fragilis, *Bernh.*
ASPIDIUM thelypteris, *Swartz.*
noveboracense, *Willd.*
spinulosum, *Swartz.*
cristatum, *Swartz.*
marginale, *Swartz.*
acrostichoides, *Swartz.*
" *v.* incisum.
ONOCLEA sensibilis, *L.*
OSMUNDA regalis, *L.*
claytoniana, *L.*
cinnamomea, *L.*
BOTRYCHIUM lunarioides, *Swartz.*
" *v.* obliquum.
" *v.* dissectum.
virginicum, *Swartz.*

LYCOPODIACEÆ.

LYCOPODIUM lucidulum, *Mx.*
dendroideum, *Mx.*
clavatum, *L.*
complanatum, *L.*
SELAGINELLA apus, *Spring.* Niag. f.

HYDROPTERIDES.

AZOLLA caroliniana, *Willd.* Roch.

(F.)

Abstract of Meteorological Observations kept by David Johnson, Newbury, Vt., for the year 1863.

MONTHS.	THERMOMETER.							WINDS.								WEATHER.							
	6 o'clock A. M.	12 o'clock noon.	6 o'clock P. M.	Highest.	Lowest.	Range.	Mean heat.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Clear.	Cloudy.	Rain.	Snow.	Snow and rain.	Inches of snow.	Warmest day.	Coldest day.
January	20.3	25.7	28.	42	–5	47	24.6	....	....	....	2	....	12	....	17	10	12	3	3	3	23	5th	18th
February	16.8	22.2	24.2	40	–20	60	20.7	....	....	....	2	....	12	....	14	15	8	2	2	1	6	20th	4th
March	14.	25.6	26.	44	–16	60	20.	....	2	....	1	....	12	....	16	16	3	2	10	....	26	25th	13th
April	34.	44.	41.	65	20	45	41.3	....	3	....	2	....	11	....	14	10	6	4	3	1	5	28th	2d
May	46.7	62.	61.	80	33	47	56.	....	1	....	4	....	13	....	13	16	4	9	....	2	....	23d	8th
June	53.3	67.3	66.6	82	41	41	62.	....	1	....	....	....	20	....	9	16	5	9	....	....	....	30th	4th
July	65.	73.9	72.3	84	62	22	70.6	....	1	....	3	....	21	....	6	7	8	16	....	....	....	7th	29th
August	61.	68.3	71.	82	50	32	67.5	....	2	....	....	....	16	....	12	17	3	11	....	....	....	5th	18th
September	49.4	61.4	60.5	82	30	52	56.7	....	2	....	....	....	20	....	8	17	5	8	....	....	....	16th	23d
October	41.	54.	50.7	68	17	51	49.	....	....	....	5	....	13	....	13	14	8	9	....	....	....	4th	29th
November	33.	42.8	40.	56	13	43	39.	....	2	....	5	....	14	....	9	10	10	10	....	....	....	3d	30th
December	15.3	24.	21.4	40	1	39	16.	....	....	....	3	....	11	....	17	10	12	3	2	4	10	14th	22d
	449.8	571.	562.7	84	–20	104	523.4	....	14	....	27	....	175	....	149	158	84	86	29	11	70	....	....
	37.5	47.6	46.8	......	......	......	43.6																

MEMORANDUM.

BY DAVID JOHNSON, NEWBURY, VERMONT.

AURORAS, SOLAR AND LUNAR HALOS, &c., 1863.

Jan. 23, Brilliant aurora low in the north 9 P. M.

25, Brilliant aurora low in the north 10 P. M.

Feb. 18, Bright aurora low in the north 9 P. M.

25, Bright aurora with streamers 9 P. M.

Mar. 6, Lunar halo 8 P. M.

16, One parhelion east of the sun 7 A. M.

One south of the sun at 9 A. M.

One south of the sun at 2 P. M. and one west of the sun at 3 P. M.

Solar halo at 2 P. M.

22, One parhelion north of the sun and one south of it; at the same time a luminous glow extending north and south from them, similar to the trail of a comet. They were very bright.

At half past 5, semi-circle of a Solar halo, very bright on the upper side, tinged with the hues of the rainbow, the lower half being below the horizon.

23, Solar halo at $5\frac{1}{2}$ P. M.

28, Solar halo at 11 A. M.

April 9, A pale aurora extending from the northern horizon to zenith and to the east and west.

13, Ice broke up in Connecticut River.

15, Solar halo 7 to 10 A. M.

Bright aurora 9 P. M.

18, Bright aurora 9 P. M.

19, Bright aurora 8 to 10 P. M.

May 11, Bright aurora 8 to 9 P. M.

June 9, Tuesday, a slight shock of an earthquake was felt in the evening.

Aug. 9, A brilliant aurora 9 to 10 evening.

Sept. 23, A brilliant aurora with streamers 8 to 10 P. M. The equinoctial storm commenced on the 18th instant.

Cloudy morning; heavy shower 10 to 11½ o'clock, A. M. Rained 1 P. M., rained 4 P. M., rained in the evening, with a furious wind from the southwest; wind turned northwest the night following.

Sept. 23, First frost; mercury 30° above zero.
A brilliant aurora 8 to 10 P. M. On the 22d Moose Hillock and the Franconia Mountains covered with snow.

Nov. 10, Wild geese flew south.
27, Moose Hillock appears to be as bare of snow to-day as it did in the month of June.
Solar halo at 3 o'clock P. M.
20, Snow to be seen on Moose Hillock to-day.

Dec. 10, Slight aurora 10 P. M,

APPEARANCE OF SPRING BIRDS, ETC., 1863.

MEMORANDUM BY DAVID JOHNSON, NEWBURY, VERMONT.

1863.

March 27, Robins appeared.
28, Blue birds appeared.

April 6, Ground birds appeared.
17, Barn swallows appeared, frogs heard.

May 11, Bank swallows came.
Red plum trees in blossom.
Cuckoo heard.
12, Orioles and bobolinks appeared.
13, Eaves swallows came.
15, Humming birds came.
20, Brown thrush came.
21, Apple trees in blossom.
23, Wrens came.

Nov. 10, Wild geese flew south.

Dec. 3, Connecticut River froze over.

Meteorological Observations at Rochester, for 1863. By C. Dewey.

Observations at 7 A. M., 2 P. M., and 3 P. M. Monthly results.

1. Thermometer.

1863.		Mean.	Highest mean.	Lowest mean.	Highest.	Lowest.	Range.	Average 27 years.
January ..	1st half, 33.33°	30.76°	47.67°	18.33°	55°	17°	54°	25.66°
	2d do 28.35		38.67	9.00	46	1		
February .	1st do 23.36	26.12	35.00	—1.00	43	—6	54	26.25
	2d do 28.88		43.00	12.00	48	5		
March	1st do 25.02	28.29	36.33	15.00	43	2	42	32.50
	2d do 31.35		43.00	19.33	44	12		
April	1st do 37.95	43.21	63.00	23.67	75	16	59	43.77
	2d do 48.47		55.00	40.33	67	35		
May	1st do 50.85	57.96	67.00	40.00	76	38	49	56.19
	2d do 64.62		72.00	50.67	87	47		
June	1st do 62.69	64.58	73.33	53.33	86	48	40	66.08
	2d do 66.47		78.00	57.33	88	53		
July......	1st do 74.22	71.51	79.33	62.00	91	60	34	70.43
	2d do 68.96		76.00	60.33	84	57		
August ...	1st do 74.98	69.67	80.33	67.67	90	59	46	68.56
	2d do 64.65		75.33	53.00	89	44		
September	1st do 61.51	57.96	71.67	50.88	83	41	51	60.33
	2d do 54.42		76.00	43.33	85	34		
October ...	1st do 50.89	48.52	62.67	39.67	76	30	55	47.92
	2d do 46.29		65.33	33.67	78	23		
November.	1st do 42.75	40.31	56.33	31.67	68	28	48	38.00
	2d do 37.87		49.67	22.00	56	20		
December.	1st do 32.31	28.74	46.00	13 67	52	11	46	28.26
	2d do 25.40		37.33	13.67	40	7		
	Mean,	47.30			Annual range,		97	563.95
								47.00

The mean temperature of 1863 is 47·3 degs., and of the 27 years, is 47 degs. The coldest of these years is 44.7 degs. in 1843, and the hottest is 48.3 degs. in 1853, a difference of only 3.6 degs.

The range for the year is commonly from 4 or 6 degs. below zero in winter, to 93 or to 96 degs. in summer. In 1862, 1853, 1850, 1838, and a few others, the temperature was not below zero here; at length 9 degs. below was observed with amazement, and on Jan. 18, 1857, the mercury fell to 16 degs. below; on Feb. 6, 1855, to 20 degs. at 9 P. M., and the cold was at the same degree next morning at 7 A. M., and still lower between these two hours, as at 21 degs. below at 10, and at 25 degs. at 3½ A. M. From 20 degs. below to 96 degs., would be a range of 116 degs.; the greatest range and the greatest cold ever known here at the hours of regular observation.

The Hot Period.

The "heated period" of August closed on the 11th, and began in July 29th, making fourteen days. The mean temperature of this period is 75.8 degs., which is hot enough. But, in

1848, the mean heat of the last half of July was 72.6 degs.; in 1854, was 76.9 degs.; in 1856, was 76 degs.; and in 1857, was 73.3 degs.; hot for half a month. In 1848, the mean of the first half of August, was 74 degs.; in 1853, was 76 degs.; and in 1858, was 73.5 degs.; this is hot too. I see, too, that the range above 90 degs. was more in some of them than in 1863. The great heat of the last August, was owing to the continuance of a high temperature, rarely above 90 or 92 degs. through day and night, and not to so high heat through the middle of the day.

Temperature of last half of July and first half of August for several years.

Years.	Last half of July. Mean.	First half of August. Mean.
1851	72.58	69.25
1852	70.64	66.20
1853	69.33	76.11
1854	76.90	70.02
1855	73.77	71.02
1856	76.04	69.80
1857	73.35	71.09
1858	69.67	73.47
1859	69.54	72.31
1860	67.75	67.93
1861	69.27	68.29
1862	69.31	72.89
1863	68.96	74.98
Mean	71.25	71.02

For the 26 years the heat of the last half of July is greater than that of the first half. The first half of August is warmer than the last half; but it is cooler than the last half of July. The last half of July, 1856, was 76.04, and had in it one 95 degs., one 94 degs., one 93 degs., one 91 degs., and twice 90 degs.; much higher than the "heated period."

The last half of July, 1854, was 76.9 degs.; twice 96 degs., once 92 degs., and once 90 degs.; much hotter than this hot period.

Still there was something peculiar in the state of the atmosphere in this "heated period," which was so oppressive at the north, and farther south than the District of Columbia.

2. Barometer and Rain Gauge.

1863. Months.	Mean.	Highest mean.	Lowest mean.	Highest.	Lowest.	Range.	Water.	M'thly avge. water for 27 years.
January	29.45	30.11	28.93	30.16	28.83	1.33	2.23	2.046
February	29.55	30.15	29.16	30.17	28.92	1.25	2.44	2.061
March	29.42	29.93	29.08	29.94	28.94	1.00	1.49	2.026
April	29.44	29.79	29.22	29.83	28.59	1.24	2.79	2.412
May	29.46	29.73	28.93	29.74	28.94	0.80	1.86	2.856
June	29.43	29.66	28.94	29.68	28.92	0.76	1.37	3.031
July	29.46	29.70	29.27	29.71	29.25	0.46	5.03	3.386
August	29.52	29.79	29.30	29.83	29.27	0.56	3.70	2.716
September	29.58	29.91	29.19	29.94	29.13	0.81	1.51	3.289
October	29.55	29.98	29.23	30.03	29.15	0.88	2.72	3.169
November	29.43	29.89	29.11	29.94	29.04	0.90	2.97	2.759
December	29.52	30.05	28.78	30.06	28.68	1.38	1.98	2.500
Mean,	29.48	29.49		29.44		Yr., 1.583	30.09	32.251

The mean height on the barometer for 1863, is 29.48 inches, and the range for this year, 1.58 inches. The annual means vary from 29.44 and 29.63 inches, or 0.19 inch, and their mean is 29.54 inches. The variations in the daily observations are between 30.47 and 28.24; or, as it was on the zero barometer, 28.14. The next higher to this was 28.50, and above these 28.54, 28.66, 28.70, but rarely below 28.78. All the low and rapid depressions, high wind, sometimes a tornado, sometimes rain or snow, attended or soon followed.

In some years, as 1861, the barometer showed a height below 29 inches in all the months except January and August, while in others, as in 1863, the height was above 29 inches from June 2d to December 14th. Often the period of higher elevations continues two or four days, fluctuating somewhat; but the periods of depression are shorter.

The *water* of the year is 30.09 inches, while the average is 32.251 inches, or about one-sixteenth above that measured for this year. The last column of the table, the monthly average, contains some singular differences.

3. Special Phenomena.

1863, April 3. *Magnificent Aurora Borealis.*

About 8 o'clock P. M., in a clear sky, two cotton-like bands or arches rose from the horizon, one N. of E. and the other N. of W., and soon met on the meridian N. of the zenith, perhaps 50 degs., narrower at each end, but widening upwards to 4 or 5 degs. in breadth, and the arch nearly parallel to the equator, the west

end being farthest north, broader along the middle, thick and heavy, very white, and apparently from its distinctness near the earth. At nine, it had moved just S. of the zenith, and patches formed on the N. side parallel to it, which soon lengthened to the belt, appearing like the small feathers on the side of a goose quill; as it moved south, the same forms appeared on the S. also, and directed also obliquely to belt, so that people spoke of its pen-like form. A little past the zenith it bent southwards as by a breath of wind. It began to disappear at the E. part, as if the aurora was moving westward, and about 10 degs. S. of the zenith, near half-after nine. The cloud of aurora at the N. rose some, shot up rays, and all was gone at ten. The sight had been magnificent.

1863, 20th December. *The Ice Storm.*

At Northboro', Mass., the rain of the last of the 18th and on the 19th, froze as it fell, and covered trees, shrubs and herbs with ice, which in the sun of 20 and 21st, glowed with the prismatic colors in all splendor. As this splendid scene occurred in Niagara Co. and Canada about the falls, and near Rochester a few years earlier. and was so finely described by President Hitchcock of Amherst College, as seen there by him, this case is mentioned from its extent. At the same 19th day, the "Ice Storm" was formed at Bolton and Marlborough. Bolton joins on the south the township of Northboro'; both on the E. line of Worcester Co., and Marlborough is partly between and on the east of both on the west line of Middlesex Co., and the nearest of the three is about 40 miles distant from Amherst at the west, where the phenomena occurred on the same day. On that day also, the same splendid vision appeared at Harrisburgh, Pa., some hundred miles S. and W., among the valleys of the Allegany Mountains. In all these places there was disastrous crushing of the limbs or bodies of trees, or of their being crushed to the earth. The fruit trees, as apple and pear, and the ornamental shades, by a few blasts of strong wind on this splendor, would be in ruins, which a quarter of a century would not repair. Such splendor may be far too expensive. These facts are condensed from the public papers.

The Year 1863.

The temperature of December, 1862 was higher than the average; the same was true of January, 1863, so that though February was about the average, the heat of winter was above the mean, rather warm and very pleasant, with little sleighing, but with little mud or open weather. While the mean of March (28.3 degs.) was only a little greater than that of February (26.1 degs.), the mean of April (43.2 degs.) was below the average; and as the first half of May was below the average, and the last half a little above it, the opening months were backward. The water of the three spring months was 6.14 inches, one-sixth below the average. The earth was not well prepared for summer. But June passed, giving us less than the average heat and rain, and the grass crop was much affected. The average water of June is over 3 inches, but this June gave us only 1.37. The heat of July for the first half much exceeded the average, and the rain of the month (5.03 inches) greatly surpassed the average (3.38 inches), and the under-growth of unmown grass greatly increased the yield as well as the product over other fields. The wheat harvest was near a fortnight late, but the rains made the safe gathering of it quite difficult, and sometimes impossible. The heat of August was above the average, as well as the rain, and the weather fine, when not too warm; season excellent for Indian Corn, which matured generally. In this section the harvest was bounteous, except of hay, which was below the average, and was selling here at twenty dollars the ton at the close of the year. The fruits, as cherries, peaches, apples, pears, quinces, and grapes, were plentiful, and the autumnal crops abundant and excellent. Apples were exported north and east in vast abundance from this county, and both east and west of it.

Slight frosts occurred August 29 and 30, September 22, 23, and 27; but only the last injured even tender vegetables. October 27th gave us the first severe frost, injuring corn and buckwheat, and other vegetables. On the same day was a great snow storm at St. Louis, which extended east across Illinois to Indianapolis; at St. Louis, snow six inches, temperature 24 degs. in morning and below freezing point all day. The cold was much less in Indiana and Ohio, the lowest temperature here 34 degs on the 22d; and the next colder, 33 degs. on the 25th.

But over the northwestern States, injurious frosts had occurred in August; not much injurious on the 17 and 18th; in Illinois, more injurious on the 25th, as stated by the papers; very severe on the 29 and 30th over part of Missouri and Illinois and the States northward. The section most injured is reported from actual statements to have been in Illinois, between the parallels of 40 and 42 degs., or between the latitudes of Springfield and Chicago, and from the Mississippi eastward into Indiana. The damage was less in this belt in Missouri; but considerable on the north of the belt in all the northern States. The injury was great to Indian corn and sorghum, and nearly equal to tobacco, rather greater in proportion; to buckwheat entirely ruinous, and nearly so to cotton, even south to Union Co., Illinois, and the frost was operative in western Kentucky on the more delicate plants. This cold period ranged from north to south, and the weather was milder in eastern Indiana. The frost was more severe on low grounds, moved somewhat in streaks, lighter or none on high grounds, as is found to be true commonly from the less quiet state of the atmosphere, and the sinking of the cooler and heavier air into the lower places or valleys. The injury as a whole was reckoned at 25 per cent. It may not be easy to assign a reason for the cold being less on the west of the Mississippi, in the same latitude. We know however that the cold changes sometimes begin near the west side of Lake Erie, and extend to the Atlantic; sometimes at Lake Michigan; sometimes from near the line of the Mississippi; and at others from the Rocky Mountains. Doubtless the same great forces are operating in each case, but sometimes farther east, and sometimes farther west.

The general prosperity of the agricultural interest, is matter of high congratulation and gratitude, as we think of this third year of the rebellion against the United States, the necessary supplies of our brave soldiery, the provision of the kinds of all military stores, the necessary demands of taxation, and the general purpose to bring to an end by force this reasonless war. Turning to the harvests of the three years past, we behold the grand provision made by Divine Providence, to support the vast expenses caused by this unnatural and unnecessary rebellion.

Connected with the meteorological and agricultural review, should be the grateful notice of the general prevalence of good health over the country, in the army and navy, in the field and

camp. It may not have been quite so favorable as in the two preceding years, as from the army the typhoid fever seems to have been carried to most parts of the country. Still the mortality has been less in Rochester by one-fifteenth than in 1862. No pestilence has prevailed in any section, nor wasting disease over the land. Great has been the health of all our forces, and of most of our cities and villages.

The city railways began operations July 7th, running from Deep Hollow on State street, to Mount Hope; very successful operation, and gratifying to most whom it accommodates. A few weeks after, another line run from Exchange St. west through Buffalo St. At the close of the year, most of the intended routes were in operation; a successful and useful accommodation.

(G.)

ANNUAL METEOROLOGICAL SYNOPSIS

FOR THE YEAR 1863.

Observations taken three times per day by J. B. Trembley, M. D., in the city of Toledo, Ohio: Latitude N. 41 degs., 38 mins. 47.04s.; longitude W. 82 degs., 22 mins. 17.75s. Height above the sea, 604 feet.

Barometrical Table, showing the maximum and minimum height for the different months of the year 1863; also the mean monthly height; range, greatest and least daily variation; also the maximum, minimum and mean barometer for the year 1863, 1862, 1861 and 1860:

MONTHS.	Maximum height.	Date.	Minimum height.	Date.	Mean height for the month.	Range for the month	Greatest daily variation.	Date.	Least daily variation.	Date.
January	29.7	18	28.47	4	29.185	1.23	.52	4	.06	23
February	29.67	21	28.7	19	29.3	.97	.48	20	.05	13
March	29.6	18	28.7	24	29.191	.9	.35	24	.02	20
April	29.57	4	28.55	2	29.244	1.02	.37	3	.01	23
May	29.57	21	28.7	31	29.208	.87	.33	29	.10	26
June	29.53	7	28.84	1	29.26	.69	.20	1	.01	23
July	29.57	18	29.09	25	29.327	.42	.11	19	.00	17
August	29.57	30	28.99	28	29.325	.58	.31	29	.02	1
September	29.73	22	29.00	17	29.37	.73	.22	18	.00	9
October	29.8	22	28.87	30	29.336	.93	.38	31	.00	13
November	29.72	10	28.86	24	29.275	.86	.35	4	.01	17
December	29.81	6	28.51	31	29.341	1.30	.75	31	.01	6
1863	29.81	....	28.47	....	29.28	.88	1.75	....	.00	....
1862	28.83	....	28.77	....	29.297	.72	.57	....	.00	....
1861	29.9	....	28.88	....	29.354	.63	.66	....	.00	....
1860	29.87	....	28.94	....	29.33	.68	.61	....	.00	....

Table showing the maximum, minimum, mean, range, greatest and least daily variation of the Thermometer for each month of the year 1863; also the mean temperature of the warmest and coldest day in each month, with date of the same:

Months.	Maximum height.	Date.	Minimum height.	Date.	Mean temperature for the month.	Monthly range.	Greatest daily variation.	Date.	Least daily variation.	Date.	Mean temperature of the warmest day	Date.	Mean temperature of the coldest day.	Date.
Jan	54.	3	9	18	34.104	45.	20.	9	2.	22	48.	3	16.33	16
Feb	54.	26	6	3	31.166	48.	19.	7	1.	22	47.33	26	9.33	3
March ..	63.	17	16	13	35.244	47.	25.	7	3.	19	48.66	24	24.	12
April ...	73.	24	14	1	48.615	58.	30.	1	2.	22	63.66	11	32.66	1
May	92.	23	41	6	63.06	51.	26.	1	2.	23	77.66	23	43.66	6
June ...	95.	17	51	3	68.275	44.	22.	15	7.	21	83.33	17	54.66	6
July....	93.	3	51	18	74.507	42.	20.	18	0.	23	83.	3	59.33	16
Aug.....	95.	2	43	30	72.95	52.	24.	30	5.	28	85.33	2	52.33	29
Sept....	88.	16	32	26	61.651	56.	32.	27	7.	18	78.	16	51.	21
Oct.....	76.	17	31	26	44.878	45.	28.	3	2.	23	67.	17	37.	26
Nov	65.	2	17	30	44.163	48.	23.	10	5.	16	58.	19	20.33	30
Dec	57.	4	10	20	34.223	47.	27.	8	1.	27	50.	4	17.33	17
1863....	95.	....	6	....	51.069	48.58	28.	....	0.	....	85.33	....	16.33	...
1862....	97.	....	−2	....	51.316	45.25	35.	....	1.	....	87.	....	16.33	...
1861....	96.	....	−4	....	50.368	46.66	30.	....	0.	....	87.	....	9.66	...
1860....	94.	....	10	....	49.343	44.13	41.	....	2.	....	83.	....	−2.66	...

Mean temperature for four years 50.524.

Table showing the mean temperature of each month of the years 1860, 1861, 1862 and 1863; also the mean of each year:

Months.	1860.	1861.	1862.	1863.
January	28.87	25.55	27.09	34.104
February	30.56	33.	27.317	31.166
March	42.56	35.88	34.835	35.244
April	48.37	49.43	49.35	48.615
May	63.96	55.01	60.147	63.06
June	64.18	69.48	66.186	68.275
July	72.	70.26	79.9	74.507
August	70.21	71.48	74.17	72.95
September	59.16	62.9	66.064	61.651
October	50.87	53.38	53.824	44.878
November	37.33	39.91	40.785	44.163
December	24.05	38.14	36.125	34.223
Mean for year	49.343	50.368	51.316	51.069

Table showing the mean temperature of the seasons of 1860, 1861, 1862 and 1863:

	1860.	1861.	1862.	1863.
Spring	51.63	46.77	47.977	48.973
Summer	68.79	70.4	73.418	71.91
Autumn	49.12	52.06	53.557	50.23
Winter	*29.765	25.53	30.849	30.43

Table showing the depth of snow and amount of melted snow and rain in inches precipitated during each month of 1863; also the aggregate amount for the years 1863, 1862 and 1861:

MONTHS.	Snow in inches.	Melted Snow & Rain in inches.
January	11.75	2.875
February	34.	3.562
March	13.25	2.4375
April	5.	1.875
May	......	2.4375
June	......	2.5
July	......	3.437
August	......	2.213
September	......	1.625
October	.063	3.125
November	.75	3.75
December	2.	3.
Year 1863	86.813	33.837
1862	63.	43.998
1861	41.37	39.664
Mean for 3 years	63.727	39.166

Table showing the direction from which the wind blew, number of clear, variable and cloudy days, number of days in which it rained and snowed during each month of the year 1863; also the same for the years 1862, 1861 and 1860:

* Two months—January and February.

MONTHS.	Southwest and west.	Northwest and west.	Northeast and east.	Southeast and south.	No. of clear days.	No. of variable days.	No. of cloudy days.	No. of days which it rained.	No. of days which it snowed.	Prevailing winds.
January	38	20	14	21	1	12	18	10	9	S. W. & Westerly.
February	32	17	30	5	3	10	15	4	6	do
March	34	30	26	3	3	13	15	3	12	do
April	20	27	43	00	8	8	14	6	4	N. & Easterly.
May	42	15	34	2	7	15	9	11	..	S. W. & Westerly.
June	37	29	19	5	9	13	8	8	..	do
July	36	15	32	10	2	17	12	8	..	Easterly.
August	59	8	24	2	10	9	12	14	..	S. Westerly.
September	37	16	24	13	10	13	7	7	..	S. W. & W.
October	36	26	21	10	9	9	13	11	..	do
November	67	15	6	2	3	13	14	..	3	Southwest.
December	46	12	27	8	3	8	20	3	1	do
Year 1863	482	230	300	81	68	140	157	92	35	Westerly.
do 1862	520	205	282	88	80	143	142	103	46	do
do 1861	580	192	218	105	70	185	110	51	43	do
do 1860	501	217	229	148	127	78	161	100	43	do

(H.)

ALBANY, PUBLISHED NOVEMBER 11, 1863.

PRELIMINARY NOTICE

Of some Species of Crinoidea from the Waverly Sandstone Series of Summit County, Ohio, supposed to be of the age of the Chemung group of New-York.

In the autumn of 1861, Dr. G. M. Kellogg, of Keokuk, Iowa, placed in my hands for investigation a collection of Crinoidea, among which were several species from the micaceous arenaceous shales near Richfield, Ohio. These species possess a peculiar interest, as coming from a group of strata which have of late become debatable ground; and since no one has shown a physical sequence of the strata by which these beds may be placed in the Carboniferous system, every thing in the palæontology of the period becomes of great interest; and it was with the hope of obtaining some light upon this question, that I proposed to make this investigation.

At a later period, 1862, Mr. C. A. White examined the same locality, and made further collections, which, added to those already in my hands, enhanced the interest of the whole. Other engagements, however, have postponed the completion of the investigation till the present time.

The result of this examination gives the following genera, with the number of species in each :

Actinocrinus, three species ;
Platycrinus, two species ;
Forbesiocrinus, three species ;
Poteriocrinus proper, two species ;
Poteriocrinus, Subgenus Scaphiocrinus, four species (one of these near Zeacrinus) ;
Poteriocrinus, Subgenus ? Zeacrinus, two species :

Being in all sixteen determined species, besides several undetermined ones.

The most abundant forms are of the Actinocrinus, of which all the species are very numerous in individuals. After this, one species of Forbesiocrinus is quite abundant.

Among the ACTINOCRINUS, we find an approach to some of the species in the Burlington limestone; and the same is true of one species of PLATYCRINUS, while the FORBESIOCRINUS have analogues in both the Burlington and Keokuk limestones of the Carboniferous system. Two of the species of SCAPHIOCRINUS bear a close similarity to species of the Burlington limestone, and one of the ZEACRINUS is equally like a form in the same rock.

Had the collection been investigated with the knowledge of CRINOIDEA possessed some two or three years since, we would undoubtedly have referred them to Carboniferous equivalents; but the discovery of numerous species in the Hamilton group of New-York has afforded data for comparison, of the highest interest for the solution of the problem. Applying this knowledge, therefore, to the Ohio collection, we find among the ACTINOCRINUS no species of a more carboniferous aspect than the *A. præcursor* of the Hamilton group.

The most abundant species of this genus is of the type of *A. tenuis*, DE KONINCK; *A. icosidactylus*, PORTLOCK, and *A. costus*, M'COY, of Europe, and the *A. ornatus* of the Burlington limestone; but we have in the Hamilton group the *A. eucharis* and *A. calypso*, which are equally carboniferous types.

In the FORBESIOCRINUS, one species is undistinguishable from, and apparently identical with, a species of the Hamilton group; while another, though allied to a known Carboniferous species, is even more analogous to one in the Hamilton group, and the most abundant species of the genus is allied in some respects to species of the Keokuk limestone; but an individual of the same species has been found in undoubted beds of the Chemung group in New-York.

The POTERIOCRINUS forms resemble some of those in the Hamilton group, and one species is extremely similar. In the SCAPHIOCRINUS and ZEACRINUS, we have the nearest analogues in the Burlington limestone.

Left to the evidence afforded alone by the collection, and the means of comparison at present possessed, I should infer that the geological position of these species is between the Hamilton group and the lower carboniferous beds; while the occurrence of a single species identical with one in the former group, and another identical with a species in the middle of the Chemung group, will ally them more nearly with the fauna of the Hamilton group, than with that of the Carboniferous period.

Thus far I have seen few species of other fossils which are associated in the same beds with these crinoids. The most conspicuous forms are of a peculiar character, of which we have no analogues except in the middle or lower part of the Chemung group of New-York. There are, however, other species in the same strata, which bear a close resemblance, if not positive identity, with species found in the argillaceous sandstones below the Burlington limestone of Iowa.

Farther exploration of the locality, which I hope to make, will probably afford the means for a more positive opinion regarding the geological relations of these beds. In the mean time, the publication of this notice may attract attention, and induce examination, at other points in the same horizon.

GENUS ACTINOCRINUS.

ACTINOCRINUS DAPHNE (n. s.).

Body broadly turbinate, of medium size; base slightly projecting over and beyond the column. Basal plates of moderate height, and barely indented at the suture-lines. First radial plates larger than any other plates in the body : second radials hexagonal; third radials pentagonal, hexagonal and heptagonal (sometimes the upper lateral angles being simply truncated), smaller than the second, supporting on their upper oblique edges a simple supraradial plate on each side. These supraradial plates from the outer sloping side give origin to a simple arm, and on the inner superior side they support a bifurcated plate, which in turn gives origin to two arms, making six arms to the ray. One of the ray (the anterior one probably) exhibits some appearance of having but five arms; which would give a formula of

$$\frac{\frac{5}{6\ \ 6}}{6\ \ 6} = 29 \text{ arms.}$$

In the interradial series the lower plate is hexagonal, supporting two in the second range; above which they are not known.

Arms long and slender, not bifurcating, composed of a double series of short plates. The arms in the middle become flattened on the back, and in their upper part grooved along the junction of the plates.

Tentacula long and slender, composed of several joints, each of which supports an ascending spine.

Surface of plates marked by radiating ridges, extending from the centre to the margins of the plates. Approaching the divisions of the ray, and in the supraradial series, the plates become angulated from the centre to the margins.

Column large, round, composed of alternating larger and smaller joints.

This species resembles the *A. eucharis* and *A. calypso* of the Hamilton group; differing from the first in the number of arms, and in having the subdivisions of the ray beginning as it becomes free from the cup; from the latter it differs in the greater number of arms from the ray, as well as in the angular character of the supraradial plates.

ACTINOCRINUS HELICE (n. s.).

Body short, broadly turbinate, the base overhanging the column. Basal plates somewhat deeply notched at the suture-lines. First radial plates proportionally large : second radials minute, quadrangular; third radials slightly larger than the second and pentangular, supporting supraradial plates on the upper sloping sides, giving origin to two arms in the anterior ray, three in the antero-lateral rays and four in the postero-lateral rays, giving the following formula :

$$\frac{\overset{2}{3\quad 3}}{4\quad 4} = 16 \text{ arms.}$$

Interradial areas with the first plate large, and one or two plates above it. First anal plate large, heptagonal, round and nodiform in the middle, and supporting three plates in the second range, with two or three small ones above.

Arms stout and of moderate length, composed of a double series of plates, the centres of which are elevated, producing transverse ridges on the arms. In the upper part of the arms, these ridges are broken into nodes which are sometimes sharply elevated.

Surface of plates strongly nodose, becoming subangular or ridged towards the margins.

Column comparatively strong, composed of very unequal thick joints; the larger ones being angular on the periphery, and sometimes showing a disposition to produce small nodes.

This species is of the type of *A. unicornis* of the Burlington limestone; and it is nearly related to *A. præcursor* of the Hamilton group, but that one has a stronger body and more robust arms, with but three arms from each ray. It may be compared with *A. cauliculus* of the Hamilton group, which has a smaller and less spreading base, with more numerous and very slender arms.

Associated with numerous well-marked specimens of this species are several individuals which have either an irregular arrangement of the arms, or, when regularly arranged, have a smaller number of arms : these have always two arms in the anterior ray, and, with two exceptions, four arms in the postero-lateral rays. (These two have a formula of

$$\frac{\overset{2}{2\quad 2}}{3\quad 3} = 12 \text{ arms.)}$$

In other respects they are all so precisely similar, that no distinction can be made, unless the specimens show the entire formula.

The specimens with regular arm-formula of

$$\frac{\overset{2}{2\quad 2}}{3\quad 3} = 12.$$

may be designated as a variety = Actinocrinus helice, *var.* eris.

ACTINOCRINUS VIMINALIS (n. s.).

Body short and spreading, broadly cyathiform and deeply lobed at the rays. Basal plates very small : first radial plates proportionally large; second radial plates broad, quadrangular; third radials very short and broad, pentangular, and supporting brachial plates on their upper sloping sides.

Arms two from each ray at their origin, composed of a double series of plates beyond the third or fourth above the third radial. The arms are sometimes almost regularly bifurcating near the base, and unequally divided above this. In one anterior ray the arm is regularly bifurcated below; one division again subdividing into three, and the other into five arms or branches.

The interradial areas consist of one small plate below, with two elongate plates above, which are situated between the bases of the arms. The first anal plate is smaller than the first radial plate, and above this they have not been determined.

The dome is large, ventricose, somewhat lobed in the direction of the rays, composed of numerous small flat polygonal plates.

Plates of the body little convex, sometimes elevated along the middle or approaching to subangular, with the surface striato-granulose.

Column of medium proportions, composed of thin alternating joints.

In the mode of bifurcation of its arms, this species resembles the *A. whiti* of the Burlington limestone; but the form of the body is very different. In this one, the arms become free above the third radial plates; while in that one they are united to the cup by interbrachial plates, and rise from the body in ten divisions, while these are free before subdividing, and present but five arms where they become free.

GENUS PLATYCRINUS (Miller).

PLATYCRINUS CONTRITUS (n. s.).

Body broad and short, broadly truncate at the base for the reception of a large column. Basal plates forming not more than one-third the height of the cup : radial plates wider than high. Arms short and strong, composed of a double series of plates, bifurcating on the second radial plate, which is subpentangular with short lateral sides : divisions four from each ray, except on the postero-lateral ones, where there are three on the anal side, making five to each of these rays; giving a formula of

$$\frac{4}{5}\overset{4}{-}\frac{4}{5} = 22 \text{ arms.}$$

Surface smooth.

This species is of the type of *P. burlingtonensis;* but there is no described species which approaches this one very nearly in the detail of its characters.

PLATYCRINUS GRAPHICUS (n. s.).

Body subhemispherical, rounded below, the basal plates making less than one-third the height of the calyx. First radial plates wider than high : second radials broad and short, subpentagonal. Arms comparatively long and slender, composing a double series of plates rising from the second radial in two pairs; giving, as far as can be determined, four arms from each ray.

Surface of plates obscurely marked by radiating lines of nodes. Column composed of alternating thicker and thinner joints.

This species differs from the *P. contritus* in having longer and more slender arms, and but four from each ray. The calyx also differs from that one in being nodose, at least on the radial plates; and the basal plates are smaller, and destitute of the projecting rim at their lower margins.

In the separated basal portions, and in the first radial plates, this species bears some resemblance to *P. eboraceus* of the Hamilton group of New-York.

GENUS FORBESIOCRINUS (De Koninck).

FORBESIOCRINUS COMMUNIS (n. s.).

Body in the young state regularly turbinate, and becoming more spreading in the older specimens. Basal plates sometimes visible as a thicker projecting rim more or less complete, at the summit of the column : subradial plates small, subtriangular, the lateral edges scarcely truncate. Primary radials four, wider than high : secondary radials from four to seven, varying in the different rays, smaller than the primary radials, and in different proportionate strength in different individuals. Each ray is usually three times divided, and rarely some one of the divisions again bifurcates; while in some individuals the third bifurcation is not complete.

The interradial spaces in the older individuals are marked by the presence of a single plate; while in the young specimens, no distinct plate, or but a granule, is visible. The first anal plate is small, with two or three granules above it. The patelloid plates of the rays, and their divisions, are distinctly visible throughout all parts of the body.

The column near its summit is composed of the thin joints characteristic of species of this genus, with longer and irregular joints below, sometimes swollen in the middle, giving them an annulated character.

In this species, we have the characters of the lower part of the body seen in some of the Carboniferous species of the age of the Keokuk limestone at Crawfordsville, Indiana, where there are no interradial plates, and the anal area has but one distinct plate. In those species the rays are continued above the first bifurcation, throwing off lateral armlets, but not properly bifurcating. All the carboniferous species having regularly bifurcating arms, as in this one, have interradial areas with numerous plates. This species therefore combines in part the characters belonging to two Carboniferous types of the genus, but possessing neither of them fully.

A specimen from the Chemung group at Forestville, Chautauque county, New-York, exhibits all the characters shown by this species, so far as they can be seen in a single individual, one side of which is imbedded in the rock.

FORBESIOCRINUS LOBATUS, *var.* TARDUS.

A well-preserved specimen of this Crinoid shows no important or essential difference from *F. lobatus* of the Hamilton group of New-York, described in the Fifteenth Report on the State Cabinet, page 124. The divisions and subdivisions of the rays are of precisely the same character, and in the same order. The rays are subangular, and the third radial plate is more prominent than other parts of the ray; though, from its weathered condition, not so prominent as those of the Hamilton species.

In the specimen under consideration, the plates of the ray are not quite so deeply depressed in the middle as the original of *F. lobatus;* but this difference may be in part due to the greater pressure which this one has undergone.

The difference in geological position is greater than I know in any other example of a species of this family, for the Hamilton species is from the shales of the higher portion of that group.

FORBESIOCRINUS KELLOGI (n. s.).

Body and arms somewhat robust; body short. Basal plates barely visible above the column : subradial plates small and triangular. The primary radial series consists of four plates in each ray, which diminish from below upwards. The secondary radial series consists of five in each division between the first and second bifurcations, while there are from six to eight plates in each division between the second and third bifurcations. The antero-lateral interradial areas have one somewhat prominent plate of medium size, which rests upon two adjacent first radials, and lies between the second radial plates. The postero-lateral interradial spaces have a single smaller plate, situated as in the other spaces. The first anal plate is about as large as the larger interradial plate : no other plates have been determined above this one.

The branches of the ray divide twice above the first bifurcation, and each bifurcating plate is strongly nodiform, the node angular and transverse. The surface of the ray, to the first division, is regularly convex, and the divisions become successively more angular upon the back. The surface of the plates is striato-granulose.

Column strong, composed near the body of very thin plates, and rapidly tapering below.

In the structure of the body, this species is most nearly allied to *F. communis;* differing in the nodose bifurcating plates, and in the angular divisions of the ray.

GENUS POTERIOCRINUS (Miller).

POTERIOCRINUS CRINEUS (n. s.).

Body turbinate, of medium size. Basal plates short : subradial plates of moderate size. First radials wider than high; second radials shorter than the first, strongly wedgeform above, supporting an arm on each upper side.

Arms dividing on the tenth or twelfth plate from their origin; above which, they are simple as far as known.

ARMS composed of a single series of plates which are alternately longer and shorter on the opposite sides, bearing strong tentacula on the upper part of the longer side.

THE anal area has apparently three plates attached to the calyx, while the upper part of the area is not visible in the specimens examined.

SURFACE smooth.

POTERIOCRINUS PLEIAS (n. s.).

A SPECIES of small or medium size.

BODY somewhat broadly turbinate, or expanding in the upper part. Basal plates very short; the subradial and radial plates comparatively short. The second radial is about as wide as long, supporting on each upper sloping face an arm, which is simple to the eighth plate; above which, they are unknown. The arms are composed of a single series of long subcuneiform plates, which bear tentacula on their longer sides. The anal plates are small and numerous, extending upwards into the proboscis.

SURFACE smooth or very finely granulose.

COLUMN subpentagonal, composed of alternating thicker and thinner plates.

This resembles the *P. crineus*, but is more slender in its form and structure. The arm-joints are proportionally longer than in that one.

POTERIOCRINUS CORYCIA (n. s.).

A SPECIES with a small, short, and somewhat broadly turbinate body. The basal plates are wider than high, pentangular. Subradial plates proportionally large: first radial plates once and a half as wide as high. The second radial plates are as high or higher than wide on the antero-lateral and postero-lateral rays, and supporting on their upper sloping faces, arms which bifurcate on the tenth plate above, with probably a second bifurcation above this one. The second radial of the anterior ray is twice as long as wide, truncate above, and supporting a single arm which bifurcates on the fourth plate above, giving six plates in the ray below the bifurcation, Anal plates unknown.

SURFACE somewhat strongly granulose.

This species bears considerable resemblance to *P. cauliculus* of the Burlington limestone, but differs essentially in the structure of the arms.

SUBGENUS SCAPHIOCRINUS.

SCAPHIOCRINUS (POTERIOCRINUS) ÆGINA (n. s.).

BODY shortly turbinate or subhemispheric. Basal plates very short, triangular: subradials about as wide as long, a little smaller than the first radial plates. Radial series consisting of

three plates; the first one large, wider than high, and a little projecting at the upper margin; second one short and wide, quadrangular, a little constricted in the middle. The third radials are obtusely wedgeform above and strongly constricted in the middle, and supporting a single arm on each upper sloping face.

ARMS simple throughout, composed of elongate subcylindrical joints which give origin to strong jointed tentacula from near the upper margin of their longer sides. These arm-plates are enlarged at the origin of the tentacula which are given off alternately on the two sides of the arm, giving it a tortuous direction. Plates of anal area large in the lower part, and gradually decreasing above.

COLUMN proportionally strong, subpentagonal, composed of alternating longer and shorter joints; the longer ones are wider, and subnodose on the periphery.

SURFACE of plates granulose; those of the body slightly convex.

This species is closely related to *Poteriocrinus diffusus* of the Hamilton group; but differs in having a shorter and comparatively broader body, the basal plates in that one being much longer than in this. In the arms of this one, every joint bears tentacula; while in the Hamilton species, it is only every second or third joint which bears tentacula. In their general appearance, the two species offer few points of distinction.

The *Poteriocrinus diffusus* of the Hamilton group occurs at some distance below the Genesee slate, in beds originally designated Moscow shales. Above this horizon we have the Genesee slate and Portage group, which may be stated at one thousand feet; and to this thickness must be added nearly one thousand feet of beds belonging to the Chemung group of New-York, before reaching the horizon to which these fossiliferous beds in Ohio have been referred by some geologists.

SCAPHIOCRINUS (POTERIOCRINUS) LYRIOPE (n. s.).

BODY small, subturbinate.

ARMS slender and simple, originating on the second radial plate, which is much longer than wide, and moderately constricted in the middle.

In its general features, this species resembles *Poter. ægina*, being only a little more delicate in its parts. The form of the calyx is similar, though scarcely so much spreading. The second radial plate is a bifurcating plate (instead of the third), and is much longer than the third plate in the other species. The arms and tentacula are more slender; the arm-plates not so prominent at the junction of the tentacles, and therefore not so tortuous in their direction. The surface of both the body and arms are more distinctly striato-granulose. The column is apparently round, and the plates not so unequal as in the other species.

There are several individuals of each of these species, and the characters are constant, leaving no doubt of their distinction.

SCAPHIOCRINUS SUBCARINATUS (n. s.).

BODY small, subturbinate, with elongate slender branching arms. Basal plates very minute, triangular or subpentagonal: subradials small; first radial plates wider than high; second radials longer than wide and strongly constricted in the middle,

obtusely wedgeform above, and supporting an arm on each sloping face.

Arms bifurcating on the sixth, eighth or tenth plate, and sometimes on the fourteenth plate from their base; each of the divisions again bifurcating. Arm-plates supporting jointed angular tentacula. Anal plates unknown,

Plates of the body angular in the middle, with short angular ridges running from the centre of the subradials to the basal plates, and also to the first radial plates. The second radial plate, as well as all the plates of the arms, are longitudinally angulated or carinate in the middle. The carination follows the enlargement of the arm-joint towards the origin of the tentacula, giving a somewhat tortuous direction to the arm.

Entire surface minutely granulose, or sometimes striato-granulose.

Column subpentangular, and composed of very unequal joints.

This species closely resembles *Scaphiocrinus carinatus* of the Burlington limestone, but differs in the bifurcation of the arms, and more materially in having but two radial plates in the series, while that one has three.

SCAPHIOCRINUS SUBTORTUOSUS (n. s.).

Body small, cyathiform. Basal plates minute : subradial plates about as long as wide. First radial plates much wider than long, the second and third plates very short; the latter obtusely wedgeform above, and supporting two arms, which again bifurcate on the ninth and twelfth plates from the third radial. No other bifurcations of the arms have been determined. Anal plates unknown.

The plates of the body are very prominent in the middle, with strong angular ridges extending to the margins, and joining those of the adjacent plates. Plates of the arms constricted in the middle, and longitudinally subangular.

In the structure of the calyx, fcrm and character of the plates, it resembles the *S. tortuosus* of the Burlington limestone; but in the structure of its arms, and the existence of three radial plates in the series, it more nearly resembles the *S. carinatus* of the same limestone.

GENUS ZEACRINUS (Troost).

ZEACRINUS PATERNUS (n. s.).

Body small : calyx flattened or broadly cyathiform. Basal plates very small, concealed within the cavity of the column : subradials of moderate size, wider than high, their lower margins curving into the basal depression; first radials as wide again as high, concave on their upper margins. Second radials, in the antero-lateral and postero-lateral rays, subequal or a little wider than high, obtusely wedgeform above, and supporting an arm on each sloping face; each of which, in the antero-lateral rays, again bifurcates on the eighth or tenth plate above their

origin, and the outer branch again bifurcating, while the inner one continues simple. The bifurcations of the postero-lateral rays have not been determined. In the anterior ray, the second radial plate is truncate above, and supports a single arm, which divides on the fifth plate above the second radial, and again on the tenth plate in one division and on the twelfth in the other; above which, it continues simple.

ARMS rounded on the back, composed of a single series of very short plates. Anal plates unknown.

SURFACE of the plates nearly smooth, or with arching lamellose striæ.

COLUMN small, round, composed near the body of thin alternately larger and smaller plates. Arms much swollen at the bifurcations.

This species closely resembles the *Z. scoparius* of the Burlington limestone in its general features and the bifurcation of the arms; but differs in having a more spreading calyx, and a much greater proportional length of the arms, the plates of which are thicker, and not flattened on the back as in that one. The anterior ray also differs in that one, having but two plates between the second radial plate and the first bifurcation.

ZEACRINUS MEROPE (n. s.).

BODY small, very broadly turbinate, subangular above from the prominence of the second radial plates. Basal plates small, triangular: subradial plates about equal in length and breadth. First radials much wider than high: second radials about as wide as high, constricted in the middle and angulated longitudinally, each one of them supporting a pair of arms which rise from the upper sloping faces of the plate. In the antero-lateral rays, the arms bifurcate on the sixth and eighth plates from their base; the outer division again bifurcating on the tenth plate above the first division, and the inner division continuing simple throughout. In the anterior ray, the second radial plate is truncate above; and the second plate above that one becomes a bifurcating plate, supporting two arms which bifurcate on the tenth plate above their origin. Anal plates small.

ARMS composed of short wide equal-sided plates, which are angular on the back. The plates of the body are marked by indistinct radiating ridges, which show a tendency to become nodose. Second radial plates strongly angular, and subcarinate along the middle.

THE surface of the plates of the arms is striato-granulose.

COLUMN, near the body, composed of thin unequal plates, and showing a tendency to become subangular below.

This species differs from the *Z. paternus* in the turbinate form of the calyx, the angulated and sculptured surface of the body, and the subangular form of the arms. In the anterior ray, it differs in the division of the arms taking place on the fourth radial, instead of the seventh as in that one.